JPRS-UEN-84-005

15 FEBRUARY 1984

USSR REPORT

ENERGY

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JPRS-UEN-84-005

15 February 1984

USSR REPORT

ENERGY

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/Text/ Oil and Gas: How Drilling is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of drilling plans for the first quarter of 1983 (given as a percentage of plan)

	March		Jan - Mar	
	Total Drilling	Exploration	Total drilling	Exploration
Azneft Association	104.7	102.3	104.8	103.8
Apsheronskoye UBR (G.Gasanov) (M.Mamedov)	110.3	105.2	103.7	53.1
Siazanskoye UBR (Kagramanov Guvvetov)	106.7	60.5	105.1	75.3
Ali-Bayramlinskoye UBR (G. Alekperov and N. Ismaylov)	107.6	132.7	104.4	115.9
Neftechalinskoye UBR (D. Akhundov and A. Guseynov)	94.2	72.1	106.8	146.9
Kyursanginskoye UBR (A. Bakhshiyev and Sh. Abilov)	103.0	184.4	103.8	107.3
Gobustanskoye UBR (A. Abdullayev and G. Israfilov)	102.6	102.6	102.7	102.7
Dzharlinskoye UBR (R. Veliyev and M. Dzhafarov)	112.0	87.7	108.9	59.8

VPO Kaspmorneftegazprom	83.0	47.6	97.2	90.4
MUBR Neftyanyye Kamni (O. Abasov and K. Dadashev)	107.8	-	115.5	-
MUBR Peschaninskoye (Sh. Mekhtiyev and B. Mamedov)	100.2	-	111.8	-
MUBR Sangachalskoye (M. Mamedov and M. Alekskerov)	88.0	-	94.0	-
MURB Primorskoye (A. Ismaylov and E. Imanov)	104.3	65.0	105.3	103.6
MURB Bulla (A. Abbasov and M. Mamedov)	100.1	100.1	101.5	101.5
MURB Bukhta Ilicha (A. Gasymov and O. Suleymanov)	38.4	11.6	86.0	66.8
MURB so STS (O. Selimkhanov and A. Muradverdiyev)	36.3	36.3	32.3	32.3
Total for Azerbaijan SSR	95.3	76.3	101.5	92.4

In spite of fulfilling the plans for drilling in the first quarter overall for the republic, the VPO Kaspmorneftegazprom did not meet its plan. It fell short of its drilling plan by 2,000 meters. The drilling administrations Sangachalskoye, Bukhta Ilicha did not meet their plans owing to specialized equipment, which fell short of the drilling plan by 6,300 meters. The Azneft association permitted a lag in exploration drilling by allowing the Dzharlinskoye URB, Apsheronskoye UBR and the Siazanskoye UBR not to meet their drilling plan by 3,700 meters.

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/Text/ Oil and Gas: How Extraction is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the oil and gas extraction plans for the first quarter of 1983 (given as a percentage of plan)

	March		Jan - Mar	
	Oil	Gas	Oil	Gas
Azneft Association	101.7	110.8	100.2	109.6
NGDU Leninneft (R. Vezirov, chief, and M.Mamedov, party secretary)	93.7	106.6	94.6	102.4
im. 26 Bakinskikh komissarov (A. Bagiyev and Ch. Mustafayev)	100.0	102.0	101.1	102.3
Ordzhonikidzeneft (Z. Tagiyev and R. Ragimov)	100.4	110.2	100.1	109.9
Karadagneft (K. Kerimov and M. Ragimov)	104.8	143.9	105.6	126.4
Kirovneft (S. Nazarov and I. Ibragimov)	100.0	105.7	100.6	105.1

Azizbekovneft (T. Gasanov and M. Alpatov)	100.0	100.4	100.8	108.8
Siazanneft (M. Musayev and A. Medzhidov)	83.2	100.6	94.2	105.5
Shirvanneft (V. Mamedov and Z. Geydarov)	102.2	110.0	100.9	110.7
Salyanyneft (F. Guseynov and T. Gasanov)	106.2	103.1	103.2	103.7
Neftechalaneft (S. Mamedov and I Dzhafarov)	100.0	105.4	89.2	120.7
Muradkhanlyneft (T. Zeynalov and I. Babayev)	210.0	100.0	137.6	100.0
VPO Kaspmorneftegazprom	100.3	100.9	100.4	101.0
PO im. XXII CPSU Congress (R. Ibragimov and N. Zaidov)	100.0	100.0	100.1	100.0
NGDU Artemneftegaz (B. Khalilov and T. Azizov)	100.0	106.2	100.0	110.0
im. Serebrovskoye (F. Musayev and V. Alekperov)	100.0	106.6	100.7	106.2
im. N. Narimanov (G. Gumbatov and E. Mamedov)	100.0	102.3	100.5	103.3
im. 50-letiye SSSR (B. Mamedov and A. Ponyayev)	103.0	91.7	101.3	91.8
Total for Azerbaijan	100.8	101.4	100.3	101.4

The NGDUs Leninneft, Siazanneft and Neftechalneft fell short of their plans for the first quarter by 180,000 tons of oil.

The Kaspmorneftegazprom Association did not meet its additional assignment for oil extraction, falling short of its assignment by 116,500 tons.

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/Text/ Oil and Gas: How Extraction is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of oil and gas for the period January through April 1983 (given as a percentage of the plan)

	April		Jan - April	
	Oil	Gas	Oil	Gas
Azneft Association (General Director B. Gadzhiyev)	100.0	125.7	100.2	113.4
NGDU Leninneft (R. Vezirov and M. Mamedov)	96.9	101.2	95.2	102.1

im. 26 Bakinskikh komissarov (A. Bagiyev and Ch. Mustafayev)	103.1	101.3	101.6	102.1
Ordzhonikidzeneft (Z. Tagiyev andR. Ragimov)	100.0	109.8	100.1	109.9
Karadagneft (K. Kerimov and M. Ragimov)	103.7	159.6	105.1	133.8
Kirovneft (S. Nazarov and I. Izbragimov)	100.0	106.5	100.4	105.4
Azizbekovneft (T. Gasanov and M. Alpatov)	100.0	112.5	100.6	109.5
Siazanneft (M. Musayev and A. Medzhidov)	100.0	100.6	95.7	104.2
Shirvanneft (V. Mamedov and Z. Geydarov)	103.9	122.1	101.6	113.4
Salyanyneft (F. Guseynov and T. Gasanov)	107.5	146.9	104.3	113.2
Neftechalaneft (S. Mamedov and I. Dzhafarov)	41.0	133.3	77.1	123.0
Muradkhanlyneft (T. Zeynalov and I. Babayev)	100.3	100.0	128.6	100.0
VPO Kaspmorneftegazprom (chief, K. Abasov)	100.1	105.2	100.1	101.0
PO im. XXII CPSU Congress (S. Ibragimov and N. Zaidov)	100.0	100.0	100.1	100.0
NGDU Artemneftegaz (B. Khalilov and T. Azizov)	100.0	110.0	100.0	109.9
im. Serebrovskoye (F. Musayev and V. Alekperov)	103.1	114.5	101.3	108.2
im. N. Narimanov (G. Gumbatov and E. Mamedov)	102.6	111.3	101.0	105.1
im. 50-letiye SSSR (B. Mamedov and A. Ponyayev)	89.4	90.7	98.0	91.5
Total for the associations	100.0	106.2	100.1	102.5

According to results for January-April 1983 in the Azneft Association the following NGDUs did not meet their oil extraction plans: Leninneft, Siazanneft and Neftechalaneft. These organizations fell short of their plan by 25,300 tons. The NGDU im. 50-letiye SSSR in April fell short of its plan for oil and gas extraction, as a result of which at the end of four months the organization has some 5,400 tons of oil and 123.6 million cubic meters of gas to make up.

The Kaspmorneftegazprom Association did not fulfill its additional task for oil extraction against which some 164,100 tons of oil were not extracted.

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/Text/ Oil and Gas: How Drilling is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of drilling plans for the period January-April 1983 (given as a percentage of plan)

	April		Jan - April	
	Total drilling	Exploratory	Total drilling	Exploratory
Azneft Association (General Director B. Gadzhiyev)	101.9	85.4	104.0	91.3
Apsheronskoye UBR (G. Gasanov and M. Mamedov)	105.5	19.4	104.2	46.8
Siazanskoye UBR (I. Kagramanov and I. Guvvetov)	75.8	29.8	96.9	62.1
Ali-Bayramlinskoye UBR (G. Alekperov and N. Ismaylov)	107.1	79.1	105.2	104.4
Neftechalinskoye UBR (D. Akhundov and A. Guseynov)	105.0	102.9	106.3	137.1
Kyursanginskoye UBR (A. Bakhshiyev and Sh. Abilov)	102.8	148.4	103.5	119.1
Gobustanskoye URB (A. Abdullayev and G. Israfilov)	93.9	93.9	100.4	100.4
Dzharlinskoye URB (R. Veliyev and M. Dzhafarov)	107.4	85.4	108.5	67.5
VPO Kaspmorneftegazprom (K. Abasov)	89.2	77.7	92.3	78.3
MUBR Neftyanyye kamni (O. Abasov and K. Dadashev)	105.5	-	112.9	-
MUBR Peschaninskoye (Sh. Mekhtiyev and B. Mamedov)	100.5	-	108.9	-
MUBR Sangachalskoye (M. Mamedov and M. Aleskerov)	60.6	-	85.4	-
MURB Primorskoye (A. Ismaylov and E. Imanov)	102.7	104.6	104.6	103.9
MURB Bulla (A. Abbasov and M. Mamedov)	42.5	42.5	84.5	84.5
MURB Bukhta Ilicha (A. Gasymov and O. Suleymanov)	136.0	70.3	100.3	67.9
MURB so STS (O. Selimkhanov and A. Muradverdiyev)	108.2	108.2	52.5	52.5
Total for the associations	96.2	81.4	98.6	84.9

In spite of fulfilling the January-April drilling plan overall, the Azneft Association did not meet its goal for exploratory drilling. As of this date the association owes 3,000 meters of exploratory drilling. The Siazanskoy URB fell short of its drilling plan by 300 meters. The Siazanskoy UBR, the Apsheronskoye UBR and the Dzharlinskoy UBR fell short of their plan by 5,100 meters and are behind in their exploratory drilling.

The VPO Kaspmorneftegazprom fell short of its drilling target by 8,500 meters. The Sangachalskoye and Bulla drilling administrations did not meet their drilling plans, owing to specialized equipment, by 10,500 meters. These administrations and also the MURB Bukhta Ilicha are behind in their exploratory drilling, having failed to meet their plan by 7,800 meters.

/6 Aug 83 p 1/

/Text/ Oil and Gas: How Extraction is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the oil and gas extraction plans for the period January through July 1983 (given as a percentage of plan)

	July		Jan - July	
	Oil	Gas	Oil	Gas
Azneft Association	100.2	104.9	100.2	112.0
NGDU Leninneft (R. Vezirov and M. Mamedov)	100.0	100.7	97.3	101.5
NGDU im. 26 Bakinskikh komissarov (A. Bagiyev and A. Mustafayev)	100.0	101.8	100.9	101.9
NGDU Ordzhonikidzeneft (Z. Tagiyev and r. Ragimov)	100.0	109.1	100.0	109.6
NGDU Karadagneft (K. Kerimov and M. Ragimov)	100.1	116.3	103.3	122.4
NGDU Kirovneft (T. Mamedov and I. Ibragimov)	100.1	104.0	100.3	105.7
NGDU Azizbekovneft (T. Gasanov andM. Alpatov)	100.0	106.8	100.3	108.8
NGDU Siazanneft (M. Musayev and A. Medzhidov)	100.0	100.0	97.5	102.3
NGDU Shirvanneft (V. Mamedov and V. Geydarov)	100.0	101.1	101.0	111.8
NGDU Salyanyneft (F. Guseynov and G. Gasanov)	105.3	101.8	103.5	116.9
NGDU Neftechalaneft (S. Mamedov and I. Dzhafarov)	67.8	127.9	82.4	122.5
NGDU Muradkhanlyneft (S. Muradov and I. Babayev)	125.9	100.0	120.7	100.0
	100.3	103.4	100.1	103.2

VPO Kaspmorneftegazprom	100.3	103.4	100.1	103.2
PO im. XXII CPSU Congress (S. Ibragimov and N. Zaidov)	103.4	100.0	100.9	100.0
NGDU Artemneftegaz (B. Khalilov andT. Azizov)	100.0	115.0	100.0	110.6
NGDU imeni Serebrovskoye (F. Musayev and V. Alekperov)	100.0	105.4	100.7	109.4
NGDU imeni N. Naimanov (G. Gumbatov and E. Mamedov)	102.1	100.2	101.9	104.6
NGDU imeni 50-letiye SSSR (B. Mamedov and A. Ponyayev)	82.1	101.8	91.7	94.0
Total for the associations	100.3	103.4	100.2	103.7

According to the results for January-July 1983 for the Azneft Association the NGDUs Leninneft, Neftechalaneft and Siazanneft did not fulfill their oil extraction plans; they fell short of their target by 28,100 tons. The NGDU imeni 50-letiye SSSR, based on results for the seven months of the current year, is behind by 42.200 tons of oil and 154.6 million cubic meters of natural gas.

The VPO Kaspmorneftegazprom did not meet its additional assignment for oil extraction, against which it failed to extract some 284,600 tons.

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/Text/ Oil and Gas: How Drilling is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on the fulfillment of the drilling plans for January-July 1983 for the Azneft Association and the VPO Kaspmorneftegasprom. (Given as a percentage of plan)

	July		Jan - July	
	Total drilling	Exploratory	Total drilling	Exploratory
Azneft Association	68.6	59.7	96.7	91.6
Apsheronskoye UBR (G. Gasanov and M. Mamedov)	100.1	138.3	100.2	63.3
Siazanskoye UBR (I. Kagramanov and I. Guvvetov)	55.5	42.2	87.2	50.7
Ali-Bayramlinskoye UBR (G. Alekperov and N. Ismaylov)	45.6	30.3	93.0	92.7
Neftechalinskoye UBR (D. Akhundov and a. Guseynov)	77.3	37.0	100.2	111.3
Kyursanginskoye UBR (A. Bakhshiyev and Sh. Abilov)	41.9	85.9	92.2	144.2
Gobustanskoye URB (A. Abdullayev and G. Israfilov)	104.4	104.4	103.6	103.6

In spite of fulfilling the January-May 1983 drilling plan overall, the Azneft Association did not meet its exploratory drilling plan and now owes 3,000 meters. The Siazanskoye UBR did not fulfill its drilling plan by 1,100 meters. The Apsheronskoye UBR, Siazanskoye UBR and the Dzharlinskoye UBR, which fell short of their plan by 6,200 meters, are lagging in their exploratory drilling.

The VPO Kaspmorneftegazprom has not met its drilling plan for the five months, having fallen short of their plan by 12,400 meters. The Sangachalskoye and Bulla drilling administrations fell short of their drilling plans by 14,000 meters, owing to specialized equipment. The MURBs Bulla, so STS and Bukhta Ilicha fell short of their drilling plan by 10.600 meters.

[8 Jun 83 p 1]

/Text/ Oil and Gas: How Extraction is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the oil and gas extraction plans for the first six months of 1983. (Given as a percentage of the plan)

	June		Jan - June	
	Oil	Gas	Oil	Gas
Azneft Association	100.4	110.8	100.2	113.3
NGDU Leninneft (R. Vezirov and M. Mamedov)	100.0	100.8	96.8	101.7
NGDU im. 26 Bakinskikh komissarov (A. Bagiyev and Ch. Mustafayev)	100.0	102.1	101.0	101.9
NGDU Ordzhonikidzeneft (Z. Tagiyev and R. Ragimov)	100.0	109.4	100.1	109.7
NGDU Karadagneft (K. Kerimov and M. Ragimov)	100.9	105.1	103.9	123.5
NGDU Kirovneft (T. Mamedov and I. Ibragimov)	100.0	107.7	100.3	106.0
NGDU Azizbekovneft (G. Gasanov and M. Alpatov)	100.0	106.3	100.4	109.1
NGDU Siazanneft (M. Musayev and A. Medzhidov)	100.0	100.2	97.1	102.7
NGDU Shirvanneft (V. Mamedov and Z. Geydarov)	100.4	115.2	101.1	113.8
NGDU Salyanyneft (F. Guseynov and G. Gasanov)	102.2	123.9	103.3	119.5
NGDU Neftechalaneft (S. Mamedov and I. Dzhafarov)	100.0	115.6	84.8	121.9
NGDU Muradkhanlyneft (S. Muradov and I. Babayev)	102.7	100.0	120.0	100.1

Dzharlinskoye URB (R. Veliyev and M. Dzhafarov)	34.0	19.7	95.1	67.7
VPO Kaspmorneftegazprom	88.9	82.7	90.6	80.6
MUBR Neftyanyye kamni (O. Abasov and K.Dadashev)	108.6	-	113.0	-
MUBR Peschaninskoye (Sh. Mekhtiyev and B. Mamedov)	100.5	-	106.0	-
MUBR Sangachalskoye (M. Mamedov and M. Aleskerov)	90.2	-	83.2	-
MURB Primorskoye (A. Ismaylov and E. Imanov)	81.0	98.5	100.1	108.5
MURB Bulla (N. Ragimov and M. Mamedov)	100.3	100.3	91.8	91.8
MURB Bukhta Ilicha (A.Gasymov and O. Suleymanov)	67.9	61.7	99.1	71.1
MURB so STS (V. Aliyev and A. Muradverdiyev)	48.7	48.7	46.3	46.3
Total for the associations	77.1	71.6	93.9	85.9

During the period January-July 1983 the Azneft Association fell short of its drilling plan by 8,300 meters. The drilling administrations of Siazanskoye, Ali-Bayramlinskoye, Kyursanginskoye and Dzharlinskoye did not fulfill their plans and now owe some 10,200 meters of drilling. The association fell short of its exploratory drilling goal by 5,700 meters. The Siazanskoye, Dzharlinskoye, Apsheronskoye and Ali-Bayramlinskoye drilling administrations underdrilled by 6,300 meters.

The VPO Kaspmorneftegazprom fell short of its drilling plan by 18,900 meters. The Sangachalskoye and Bulla drilling administrations fell short of their plans by 20,300 meters owing to specialized equipment. The association fell short of its exploratory drilling plan by 13,900 meters. The MURB Bulla and the MURB so STS and the MURB Bukhta Ilicha underdrilled by 14,800 meters.

MURB so STS and the MURB Bukhta Ilicha underdrilled by 14,800 meters.

/8 Jun 83 p 17

/Text/ Oil and Gas: How Extraction is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the oil and gas extraction plans for the period January to May 1983. (Given as a percentage of plan)

VPO Kaspmorneftegazprom	100.3	106.2	100.1	103.2
PO im. XXII CPSU Congress (S. Ibragimov and N. Zaidov)	102.7	100.0	100.5	100.0
NGDU Artemneftegaz (B. Khalilov and T. Azizov)	110.0	110.0	100.0	110.0
NGDU imeni Serebrovskoye (F. Musayev and V. Alekperov)	100.0	114.0	100.9	110.1
NGDU imeni N. Narimanov (G. Gumbatov and E. Mamedov)	102.3	105.0	101.9	105.3
NGDU imeni 50-letiye SSSR (B. Mamedov and A. Ponyayev)	83.6	96.2	93.5	92.7
Total for the associations	100.3	106.4	100.2	103.7

According to the totals for January-June 1983 for the Azneft Association the Leninneft, Siazanneft and Neftechalaneft NGDU's did not fulfill their oil extraction plans; they fell short against a plan calling for 25,300 tons. The NGDU imeni 50-letiye SSSR failed to meet its plan in June for the extraction of oil and gas, as a result of which according to the results for the six months of the current year it now owes 27,900 tons of oil and 161.1 million cubic meters of gas to the plan.

The VPO Kaspmorneftegazprom did not meet its additional task for oil extraction, against which some 244,600 tons of oil were not extracted.

/9 Jun 83 p 1/

/Text/ Oil and Gas: How Drilling Is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the drilling plans for the first six months of 1983. (Given as a percentage of the plan)

	June		Jan - June	
	Total drilling	Exploratory	Total drilling	Exploratory
Azneft Association	96.5	118.1	102.1	97.8
Apsheronskoye UBR (Gasanov and M. Mamedov)	81.1	151.9	100.3	53.6
Siazanskoye UBR (I. Kagramanov andI. Guvvetov)	100.5	55.7	93.2	52.6
Ali-Bayramlinskoye UBR (G. Alekperov and N. Ismaylov)	88.4	89.1	102.0	105.2
Neftechalinskoye UBR (D. Akhundov and A. Guseynov)	101.2	136.6	104.6	128.0
Kyursanginskoye UBR (A. Bakhshiyev and Sh. Abilov)	100.1	300.0	102.4	154.9

[8 Jul 83 p 1]

[Text] Oil and Gas: How Extraction is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the oil and gas extraction plans for the period January to May 1983. (Given as a percentage of plan)

Gobustanskoye UBR (A. Abdullayev and G. Israfilov)	103.8	103.8	103.4	103.4
Dzharlinskoye UBR (R. Veliyev and M. Dzhafarov)	100.2	89.7	107.8	78.0
VPO Kaspmorneftegazprom	89.2	93.6	90.8	80.2
MUBR Neftyanyye kamni (O. Abasov and K. Dadashov)	116.0	-	113.7	-
MUBR Peschaninskoye (Sh. Mekhtiyev and B. Mamedov)	100.8	-	107.0	-
MUBR Sangachalskoye (M. Mamedov and M. Aleskerov)	67.8		82.1	-
MURB Primorskoye (A. Ismaylov and E. Imanov)	100.2	123.1	103.5	110.2
MURB Bulla (A. Abbasov and M. Mamedov)	100.1	100.1	90.3	90.3
MURB Bukhta Ilicha (A. Gasymov and O. Suleymanov)	114.6	103.8	106.0	73.7
MURB so STS (V. Aliyev and A. Muradverdiyev)	43.0	43.0	45.9	45.9
Total for the associations	93.2	104.7	97.1	88.7

In spite of fulfilling the January-June drilling plan overall, the Azneft Association did not meet its exploratory drilling target and now owes 1,200 meters of drilling to the plan. The Siazanskoye UBR fell short of its drilling plan by 1,100 meters. The Apsheronskoye UBR, the Siazanskoye UBR and the Dzharlinskoye UBR lagged behind their exploratory drilling, falling short of their plan by 6,800 meters.

The VPO Kaspmorneftegazprom did not fulfill its drilling plan for the first six months of the year, having fallen short of the plan by 15,600 meters. The Sangachalskoye and Bulla administrations fell short of their plan by 18,200 meters owing to specialized equipment. The association fell short of its exploratory drilling plan by 11,900 meters. The MURB Bulla, so STS and Bukhta Ilicha underdrilled by 12,000 meters.

/9 Jul 83 p 1/

/Text/ Oil and Gas: How the Drilling Is Proceeding

Data from the Azerbaijan SSR Central Statistical Administration on fulfillment of the drilling plan for the period January-May 1983. (Given as a percentage of plan)

	May		Jan - May	
	Total drilling	Exploratory	Total drilling	Exploratory
Azneft Association (General Director B.A.Gadzhiyev)	101.7	1007.	103.5	93.5
Apsheronskoye UBR (Gasanov and M. Mamedov)	102.7	13.0	103.9	44.5
Siazanskoye UBR (I, Kagramanov and I. Guvvetov)	74.1	18.2	91.5	51.8
Ali-Bayramlinskoye UBR (G. Alekperov and N. Ismaylov)	105.1	123.6	105.2	109.2
Neftechanlinskoye UBR (D. Akhundov and A. Guseynov)	102.1	89.0	105.4	126.4
Kyursanginskoye UBR (A. Bakhshiyev and Sh. Abilov)	100.8	149.3	102.9	125.8
Gobustanskoye URB (A. Abdullayev and G. Israfilov)	114.1	114.1	103.4	103.4
Dzharlinskoye URB (R. Veliyev and M. Dzhafarov)	113.6	101.5	109.8	75.3
VPO Kaspmorneftegazprom (K. Abasov)	87.0	72.6	91.2	77.0
MUBR Neftyanyye kamni (O. Abasov and K. Dadashev)	114.7	-	113.3	-
MUBR Peschaninskoye (Sh. Mekhtiyev and B. Mamedov)	105.7	-	108.2	-
MUBR Sangachalskoye (M. Mamedov and M. Aleskerov)	83.0	-	84.9	-
MURB Primorskoye (A. Ismaylov and E. Imanov)	103.0	119.3	104.2	107.4
MURB Bulla (A. Abbasov and M. Mamedov)	100.4	100.4	88.1	88.1
MURB Bukhta Ilicha (I. Gasymov and O. Suleymanov)	117.8	63.1	104.2	66.7
MURB so STS (O. Selimkhanov and A. Muradverdiyev)	27.1	27.1	46.6	46.6
Total for the associations	95.4	86.2	97.9	80.8

	May		Jan - May	
	Oil	Gas	Oil	Gas
Azneft Association (B.A.Gadzhiev)	100.2	115.2	100.2	114.0
NGDU Leninneft (R. Vezirov and and M. Mamedov)	100.0	100.8	96.2	101.8
NGDU im. 26 Bakinskikh komissarov (A. Bagiyev and Ch. Mustafayev)	100.0	101.3	101.3	101.9
NGDU Ordzhonikidzeneft (Z. Tagiyev and R. Ragimov)	100.0	109.4	100.1	109.8
NGDU Karadagneft (K. Kerimov and M. Ragimov)	102.2	109.2	104.5	127.8
NGDU Kirovneft (S. Nazarov and I. Ibragimov)	100.0	106.8	100.3	105.7
NGDU Azizbekovneft (T. Gasanov and M. Alpatov)	100.0	110.0	100.5	109.6
NGDU Siazanneft (M. Musayev and A. Medzhidov)	100.0	100.1	96.6	103.3
NGDU Shirvanneft (V. Mamedov and Z. Geydarov)	100.0	113.7	101.3	113.5
NGDU Salyanyneft (F. Guseynov and G. Gasanov)	100.3	139.9	103.5	118.6
NGDU Neftechalaneft (S. Mamedov and Dzhafarov)	100.0	122.1	81.8	122.8
NGDU Muradkhanlyneft (A. Kerimov and A. Babayev)	100.0	100.0	123.0	100.0
VPO Kaspmorneftegazprom (K. Abasov)	100.2	105.6	100.1	102.6
PO im. XXII CPSU Congress (S. Ibragimov and S. Zaidov)	100.0	100.0	100.1	100.0
NGDU Artemneftegazprom (B. Khalilov and T. Azizov)	100.0	110.4	100.0	110.0
NGDU imeni Serebrovskoye (F. Musayev and V. Alekperov)	100.0	113.9	101.0	109.3
NGDU imeni Narimanov (G. Gumbatov and E. Mamedov)	105.0	106.5	101.8	105.4
NGDU im. 50-letiye SSSR (B. Mamedov and A. Ponyayev)	87.2	94.0	95.6	92.0
Total for the associations	100.2	106.0	100.1	103.2

According to the totals for January-May 1983 for the Azneft Association the NGDUs Leninneft, Siazanneft and Neftechalaneft did not fulfill their oil extraction plans; they fell short by 25,300 tons. The NGDU imeni 50-letiye SSSR failed to meet its plan in May for oil and gas extraction, as a result, according to results for the five months of the current year, it is now indebted to the plan for 15,400 tons of oil and 146.8 million cubic meters of gas.

The VPO Kaspmorneftegazprom did not meet its additional task for oil extraction, against which some 205,900 tons were not extracted.

UDC 622.272.8:622.33.012.2

DETERMINING PLANNED PRODUCTIVITY OF MINE

Moscow UGOL' in Russian No 11, Nov 83 pp 16-17

[Article by I. G. Roshchupkin, candidate of technical sciences, Tula Polytechnic Institute]

[Text] In the Moscow Basin the reserves of coal deposits in exploited regions are gradually being reduced. Large mines with modern mechanization and technology are now under construction or have been completed. But these mines for the time being are inadequate for meeting the needs for Moscow region coal. Provision is being made for the planning and construction of mines in new regions (in the northwestern part of Tul'skaya and in the eastern part of Kaluzhskaya Oblasts). The deposits of these regions are characterized by complex geological conditions, are discontinuous in area and are represented by individual lenses of various configurations and extents. The coal reserves in these lenses are 20-250 million tons. The deposits for the most part are characterized by limited coal reserves and it is desirable that they be worked by a single mine.

The planning of a mine for deposits with limited reserves should be "from top to bottom," that is, beginning with the setting of the productive capacity of the enterprises, then proceeding to the structural subdivisions down to the cleaning face. A different planning method can lead to a determination of productive capacity not confirmed by the reserves.

In the Moscow Basin mines with a capacity of 150-2,300 tons of coal annually with a lifetime of 15-40 years have been planned. However, in many cases the mine fields were worked out earlier, as a result of which the expenditures on construction, reconstruction and operation of the mines have not paid for themselves. Accordingly, in the planning of mines there must be a rigorous determination of the reserves in the mine fields and the genetic characteristics of the strata.

In the construction of a mine for the working of a deposit with limited coal reserves its optimum planned productivity must be established by the economic-mathematical modeling method, taking into account the increase and dropping-off of production in accordance with the following mathematical model:

$$S_{sp\,ted.} = \frac{E_n}{A}\sum K_{t_s}\left(1+E_{sr}\right)^{-t_s} + \\ + \frac{1}{At}\sum C_{t_s}\left(1+E_{sr}\right)^{-t_s} + \\ + \sum C_{t_s}^{id}\left(1+E_{sr}\right)^{-t_s} \longrightarrow \min,$$

where $S_{sp\ red}$ are the total specific reduced expenditures, rubles/ton; A is the annual planned productivity of the mine, thousands of tons; K_{t_1} are the capital expenditures for the lifetime of the mine (t_1, years), thousands of rubles; C_{t_2} are the operating expenditures during the period during which the mine attains its planned capacity to the dropoff of production (t_2, years), thousands of rubles; $C^{id}_{t_3}$ are the operating expenditures during the period of development and dropoff of production (t_3, years), thousands of rubles; E_n is the normalized coefficient of efficiency of capital investments; E_{sr} is the normalized coefficient of reduction of expenditures in time, $E_{sr} = 0.08$.

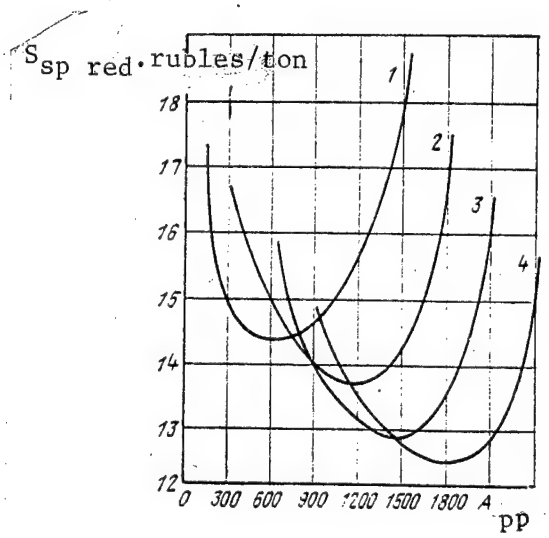

Fig. 1. Dependence of specific reduced expenditures $S_{spec\ red}$ on planned productivity of mine A_{pp} (in thousands of tons) with industrial coal reserves in deposit: 1, 2, 3, 4 -- 20, 40, 60, 80 million tons.

In the mathematical model the total capital expenditures include expenditures on constructing major mine workings, cleaning work, transport, the work complex at the surface, hoisting, water drainage and ventilation during the period t_1. The total operational expenditures include expenditures on constructing major, preparatory mine workings, maintaining mine workings, cleaning work, transport, the work complex at the surface, hoisting, water drainage, ventilation and maintaining a conditionally constant body of workers during the periods t_2 and t_3. The data base for reckoning the total expenditures are the integrated cost indices obtained on the basis of processing of the planning and some production data.

On the whole for the branch the normalized coefficients of efficiency of capital investments is constant for an adequately long period of time. But in determining the optimum parameters of mining enterprises its values must be assumed different, since the time required for paying off capital investments varies, depending on the production capacity, reserves and lifetime of the mine in a wide range.

An analysis of the operation of mines in the Moscow Basin during the last 15 years reveals that the normalized coefficient of efficiency of capital investments is not constant and varies from 0.05 to 0.25 or more.

Parameters	Annual planned productivity of mine (in thousands of tons) with industrial reserves of coal in deposit											
	20 million tons						40 million tons					
	150	300	600	900	1200	1500	300	600	900	1200	1500	1800
Computed lifetime of mine, years	133	67	33	22	16	13	133	66	44	33	27	22
Time required for mine construction, years	2	2,5	3	5	6	7	2,5	3	5	6	6	10
Normalized coefficient of efficiency of capital investments	0,03	0,05	0,06	0,07	0,09	0,10	0,04	0,06	0,08	0,10	0,115	0,13
Time needed for payoff of capital investments, years	33	20	16,6	14	11,2	10	25	16,6	12,5	10	9,7	7,7
Total reduced operating expenditures, millions of rubles	150	58	40	35,6	28,6	26	272,8	151,2	112	75,2	64	56
Specific reduced capital expenditures, rubles/ton	11	11,9	12,5	13,1	14,3	17,57	10	11,2	11,5	12	12,7	16,27
Specific reduced operating expenditures, rubles/ton	7,5	2,88	2	1,78	1,43	1,3	6,82	3,78	2,8	1,88	1,6	1,4
Total specific reduced expenditures, rubles/ton	17,5	14,88	14,5	14,88	15,73	18,87	16,82	14,98	14,3	13,88	14,3	17,67

Parameters	Annual planned productivity of mine (in thousands of tons) with industrial reserves of coal in deposit											
	60 million tons						80 million tons					
	600	900	1200	1500	1800	2100	900	1200	1500	1800	2100	2400
Computed lifetime of mine, years	133	66	50	40	33	28	89	67	53	44	38	33
Time required for mine construction, years	3	5	6	7	10	12	5	6	7	10	12	14
Normalized coefficient of efficiency of capital investments	0,07	0,083	0,10	0,125	0,14	0,166	0,112	0,134	0,166	0,187	0,221	0,25
Time needed for payoff of capital investments, years	15	12	10	8	7	6	9	8,5	6	5,4	4,5	4
Total reduced operating expenditures, millions of rubles	324	174	120	96	84	69	384	240	136	96	80	72
Specific reduced capital expenditures, rubles/ton	10,6	11,04	11,2	11,4	12,3	15,6	10,1	10,8	11,2	11,4	12,1	14,18
Specific reduced operating expenditures, rubles/ton	5,4	2,9	2	1,6	1,4	1,15	4,8	3,8	1,7	1,2	1	0,9
Total specific reduced expenditures, rubles/ton	16	13,94	13,2	13	13,7	16,75	14,9	13,5	12,9	12,6	13,1	15,88

The results of application of the mathematical model for four typical groups of deposits with industrial reserves of 20, 40, 60 and 80 million tons are given in the table. The data in the table were used in plotting the dependence of the specific reduced expenditures on annual planned mine productivity (see Fig. 1). It follows from the data in the figure that the optimum annual planned productivities of mines for deposits with industrial reserves of 20, 40, 60, 80 million tons are 600, 1,200, 1,500, 1,800 thousand tons. Taking into account the error in the computations, as well as the insignificant changes in the expenditures in the zone of the extremum, we obtain the region of optimum values of the annual planned productivities of mines in the range 1,000 to 1,500 tons of coal.

Deposits with coal reserves of 80-250 million tons should be divided into individual mine fields when establishing the productivities of mines.

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CSO: 1822/69

UDC 658.011.54/.56:622.33.012.2.001.18

ENGINEERING STATE OF ART IN FUTURE MINES

Moscow UGOL' in Russian No 11, Nov 83 pp 20-22

[Article by A. S. Burchakov, doctor of technical sciences, Moscow Mining Institute]

[Text] GENERAL PRINCIPLES. Specialists at the Moscow Mining Institute have developed a scientific school in the field of formulation of new technological and technical solutions for underground coal production -- mines of the future. Under the term "mine of the future" we do not refer to any specific mine or even proposal for a mine, but a scientific direction--the on-going formulation of new technological and technical solutions corresponding to a scientifically validated prediction of changes in the technology of coal production by the underground method.

The scientific content of the "mine of the future" problem includes the following directions:
-- formulation of technical and technological solutions for highly productive mines with traditional technology (complexly mechanized and "assembly line" excavation);
-- formulation of the scientific principles for the development of methods and apparatus ensuring waste-free production and precluding the need for man's presence when carrying out most production processes under underground conditions;
-- validation of the principles for underground coal production without the construction of shafts, precluding man's presence under underground conditions.

At the present time the technological and technical solutions constituting the first group of items in the "mine of the future" problem have been most fully formulated: creation of highly productive methods and apparatus for the underground production of coal.

The following basic principles were scientifically validated for solving the problem of increasing work productivity by a factor of 3-5: prediction for 10-15 years; a high mine productivity; a high load at the cleaning face; a high degree of concentration and intensification of mining work; simplicity of technological plans and the possibility of their modernization; smooth operation of the technological plan with uninterrupted transport from the face to the concentration plant; reduction of the volumes of auxiliary work in a mine not directly related to coal excavation (mine management, preparatory and other work); a high degree of standardization of mining and transport equipment; great

reserves of productivity, and accordingly, a high reliability of the entire technological plan; degassing of coal strata or the use of means for overcoming the ventilation barrier and ensuring safe and comfortable working conditions.

Before examining the essence of the formulated technical solutions it is necessary to mention still another fundamental aspect of the scientific approach of the Moscow Mining Institute to formulation of the problem of reducing the negative influence of rock pressure and presence of gas on the efficiency of underground mining work. The problem of the effective and safe working-out of strata containing gases or subject to bursts is one of the principal problems in mining science and practice. The employed local methods for contending with these phenomena are not adequately effective and in implementing all these measures there are unjustifiable stoppages of highly productive equipment.

In his time Academician A. A. Skochinskiy devised and Academician V. V. Rzhevskiy, the author of this article and N. V. Nozhkin later developed a regional method for hydraulic "breakdown" of a stratum through boreholes from the surface. The fundamental feature of this method is the advance (prior to working of the mine field or its parts) change in the properties and state of the coal-bearing stratum. Thus, a necessary condition for the effective working-out of mine field reserves and the use of the developed highly productive excavation apparatus should be preliminary reduction of the coal-bearing stratum to a safe state. This is being achieved by the introduction of different fluid substances and their interaction with coal, gas and rock. This results in an increase or decrease in permeability, an increase in the uniformity of strength of the rock mass, a decrease in the release of gas due to its removal from the stratum and a decrease of the danger of bursts. This method for the elimination of gas is now standard; it makes it possible not only to contend with methane, but also to use it in the national economy. This method is undergoing checking and is being introduced at individual mines as an antiburst procedure (efficiency 40-80% for gas and dust).

For the uniform processing of strata of gas-bearing rocks and rocks which are dangerous for bursts it is proposed that the hydraulic breakdown be accomplished through horizontal shafts with a length of 500-800 m situated over the stratum, under the stratum and through the stratum. From a single installation point it is possible to drill two or more boreholes (the parts of the borehole are vertical, curvilinear and horizontal; the total length is 1,615-1,815 m). The vertical and curvilinear parts of the borehole are reinforced by an operational column of cased pipe with subsequent cementing of the space outside the pipes (Portland cement). The principle for advance, preliminary reduction of the mine field to a state of maximum readiness for carrying out mining work and operation of mining equipment is one of the fundamental principles for ensuring highly productive operation of the coal mine of the future.

ESSENCE OF PRINCIPAL TECHNOLOGICAL AND TECHNICAL SOLUTIONS FOR MINE OF FUTURE. As the principal means for the mechanization of cleaning work for the mine of the future the F-1 frontal planing apparatus has been developed. This ensures the total mechanization and automation of the technological process of coal

excavation without the constant presence of people at the face. In this apparatus provision is made for the use of a working mechanism of the planing type with its constant frontal deployment to the face. Problems of its control in the vertical and horizontal planes have been solved. In addition, the apparatus includes a frame, delivery mechanism of the scraper type with an upper supporting arm, supports of the limiting types, couplings, reloader, control system, etc. The cross-sectional area of the drifts is not less than 8 m^2, the length of the column is not less than 500 m. The pickup is 50-100 mm. The handling capacity of the conveyor is up to 700 tons/hour, the speed is 2 m/sec. The daily advance of the cleaning face is 14-26 m, the shift productivity of labor is from 113 to 266 tons.

The technical specifications for the F-1 apparatus were prepared at the Moscow Mining Institute and the State Planning-Design Technological Institute of Hoisting-Transport Machine Building (GPKTI PTM) of the "Kran" Association. An experimental model of the F-1 apparatus was fabricated by the Uzlovskiy Machine Building Plant and the Malakhovskiy Experimental Plant of Giprouglemash and is undergoing acceptance tests in the Kuzbass.

The technology and means of mechanization for the excavation of coal strata without leaving pillars constitute a variant of working-out of sectors of mine strata without waste. The fundamental feature of the proposed technology is the working-out of a great part of the mine field reserves without preliminary preparation of the mine workings (OKS-1, OKS-2 complexes). The makeup of the equipment is standard-produced excavation apparatus used in combination with cross-timbering. The technical specifications were developed by the Moscow Mining Institute, the GPKTI PTM of the "Kran" Association and Kargomash. Experimental models have been fabricated by the Uzlovskiy and Novo-Karagandinskiy imeni 50-letiya Oktyabr'skaya Revolyutsiya machine-building plants. The technological plan is now being tested in the Kuzbass.

The ABT excavation apparatus with a productivity of 1,600-2,000 tons/day has been developed for the working of thin strata with a thickness of 0.6-1 m with bedding angles up to 35°. Its principal distinguishing characteristic is the matching of the breaking-off of coal and the loading of coal by means of a single actuating mechanism closed in the horizontal plane. There is a counter movement of the working and transport (empty) arms of the planing mechanism, which ensures the efficient use of the worked-out space, which is extremely limited in extent and which makes it possible to do without a special conveyor in the drift.

The AFMG-1 and AFG-2 frontal mechanohydraulic and hydraulic apparatuses, developed jointly by the "Gidrougol'" Association and the VNIIgidrougol', are intended for the mechanization and automation of the technological process of coal excavation in strata with a thickness of 2÷2.5-3.5 m with bedding angles up to 15° when working along the stratum dip or strike.

The equipment includes the K-56MG combine, mounted on rotatable platforms, and moving along a special trench, together with 2M-81E timbering. The number of working mechanisms of this combine is 4; the total available power is 160 KW; the angle of rotation in the horizontal plane is 30° and in the vertical plane

is 27-33°; regulation in thickness of the stratum is 2-3.5 m; rated handling capacity is 6 tons/min; depth of cutting is 0.7 m. The special trench serves as a support for the working mechanisms and forms a flow of pulp along the drift. The rated capacity of the apparatus is 1,500-2,000 tons/day. In addition, for conveyorization with large loads in the drift specialists at the Moscow Mining Institute have developed the 2LU-160 belt conveyor with a nominal rated capacity of 2,300 tons/hour. The conveyor is intended for slanting shafts and slopes (with an angle of 3-18°). It was developed in three variants: with lengths of 2,130, 2,710 and 3,620 m; the belt width is 1,600 mm, the rate of movement is 3.15 m/sec with angles up to 3°. The conveyor has been fabricated and will undergo acceptance tests.

Jointly with the UkrNIIproyekt the Moscow Mining Institute has prepared technical specifications for the 2LN-100 steeply slanting conveyor. In formulating the technical specifications, as the principal type of steeply slanting conveyor the choice was a conveyor with a pressure belt and provision was made for the broad standardization of the principal elements and parameters with the 2LU-160 main-line conveyor. The nominal rated capacity is 2,300 tons/hour, the width of the belt is 1,600 mm and its rate of movement is 4 m/sec. The conveyor was developed in three variants with motors having powers of 1,000, 1,500 and 2,000 KW respectively. A monorail system for carrying freight and personnel has been developed for the delivery of auxiliary materials with an MGLD-75 locomotive (the technical specifications were formulated jointly with the VNIIgidrougol'). The system can be used for the delivery of heavy equipment, materials and personnel from the surface to the face without intermediate reloading in mine workings with a complex configuration with slopes up to 35°. The power of the diesel is 55.2 KW. A load of 7-8 tons can be moved at a speed up to 15 km/hour with slopes up to 4°; a load of 3-3.5 tons is moved at a speed of 2.5 km/hour with slopes up to 35°.

In order to reduce the volume of assembly and disassembly work and increase the coefficient of continuous use of the mechanized complex a technological plan has been developed for the preparation and working-out of pillars with rotation of the apparatus by 180°; this is undergoing tests at the mines of the Kuzbass and Donbass.

TECHNOLOGICAL PLAN FOR COAL EXCAVATION WITH USE OF HEAVY FLUIDS. Depending on the mean density of the coal, as the heavy fluid it is possible to use solutions of mineral salts or suspensions. We feel that the most promising is the use of the following heavy fluids: saturated solution of sodium chloride (mean density 1,360 kg/m^3), materials from salt dumps (1,230 kg/m^3), solutions of calcium chloride (up to 1,460 kg/m^2), two-component magnetite suspensions (up to 2,000 kg/m^3).

The annual plans for scientific research work under the "mine of the future" project provide for implementation of research in the field of both improvement of modern technology with the use of existing or newly created mechanization techniques and the validation of fundamentally new technological solutions.

VALIDATION OF PRINCIPLES FOR COAL PRODUCTION TECHNIQUES WITHOUT SHAFT CONSTRUCTION. Investigations have now been made of the engineering principles for the

underground production of coal without the presence of man underground. An analysis of coal production methods without the construction of shafts has been made taking into account the geological mining conditions for mines of the future and the needs of the national economy for power and coking coals. In the analysis of production methods not involving shaft construction an allowance has also been made for their peculiarities and advantages from the point of view of multisided processing and use of coal in the national economy.

On the basis of an analysis of the geological conditions for the construction of mines by the USSR Ministry of the Coal Industry, and also on the basis of branch long-range forecasting for the purpose of further investigations for developing processes for mines of the future, we determined the ranges of exploitable thicknesses and bedding angles, the category and depth of working of coal strata, their average number per shaft and inflow of water into the shaft. We studied the degree of study and testing and the prospects for actual creation of such techniques for coal production without shaft construction as underground gasification, extraction, hydrogenization of coal, direct transformation of the chemical energy of coal into electric power on the basis of the fuel cell method, borehole hydraulic production of coal and other minerals from the surface. The investigations which have been carried out made it possible to establish that with allowance for the modern level of development of scientific and technical progress in the coal branch the most feasible variant of production without shaft construction is the borehole hydraulic production of coal.

Further scientific research work has been directed to the creation of means and methods for coal production without shaft construction, especially a borehole apparatus which is an automated mechanism performing purposeful operations underground in a completely automatic regime. A necessary condition for the operability and effectiveness of such an automated system in the geotechnological working of coal is the controllability of the technology itself and its processes. We validated the legitimacy of the idea of creating a technology for coal production without shaft construction, so-called robotized technology, in which the principal actuating mechanism is a multipurpose automated robot having a tool for the destruction of rock and coal, a movement mechanism and other functional mechanisms of a productive purpose, transducers for picking up information on the surrounding medium (sensory system) and a system for the processing of data and making decisions. Such a type of cybernetic mechanism can be assigned to the specific class of robots called mining robots.

One of the variants of a mining robot may be a borehole hydromonitoring apparatus. A study has been made of the possibility of use of standard-produced components for assembling an experimental model of the apparatus. Computations have been made of the principal parameters of the movement mechanism, consisting of thrust sections and movement jacks. Statistical computations of the forces operative on the thrust section indicated its operability when using standard-produced hydromonitors.

As already noted earlier, a mining robot is the principal element of a robotized technology without shaft construction and can have an actuating mechanism based on fundamentally different methods for the destruction of coal and

rocks. In particular, at the Moscow Mining Institute, under the direction of A. P. Dmitriyev and Yu. I. Protasov, specialists have formulated principles for creating a coal-producing robot with an electrodynamic working mechanism which has been tested in the fragmentation of rocks of large dimensions and in constructing mine workings in hard rocks. These principles served as a basis for the development of an original design of a self-propelled borehole apparatus which differs fundamentally from the borehole hydromonitoring apparatus not only with respect to the working mechanism for electrodynamic destruction, but also in the method for the transporting of broken coal and rock based on the action of air or gas (pneumatic transport). The use of the electrodynamic method in a robotized method for coal production without shaft construction has both its merits and its shortcomings. The principal merit of the method is that the breaking-off of coal is accomplished without the efforts involved in delivery of a mechanism to the face (as exist in the mechanical destruction methods) and this facilitates the construction of the apparatus and makes it maneuverable. In addition, there is simplification of overcoming of geological barriers, including solid inclusions. The shortcomings of the method include the danger of initiation of an explosion of coal dust and a methane-air mixture, and also complexity in supporting the roof in the excavated chamber. The first can be eliminated if the worked-out space is filled with a neutral gas, such as nitrogen, carbon monoxide or methane; the second can be eliminated by creating an excess of the pressure of this same air or gas, that is, pneumatic energy, in the mine working.

Pneumatic energy is the principal source of energy in implementing a whole series of production processes in the proposed technological plan, including such an important process as the transport of the broken-off rock mass. We analyzed existing methods and schemes for pneumatic transport of solid loads and computed the parameters of the pneumatic transport system, as a result of which it was demonstrated that despite the absence of analogues of such systems at the present time the idea of pneumatic transport for coal production without shaft construction is viable.

It has been established by investigations that:
-- the electrodynamic breaking-off of coal from the frontal surface of the face upon its contact with the working electrodes is accomplished with a probability of 0.9 with the following parameters: output voltage of power pulse generator not less than 168 KV; distance between electrodes 400-700 mm; mass of broken-off coal 10 kg; depth of funnel 44 mm; destruction area 20.6 dm^2; specific energy capacity of destruction 1.38 KWh/ton. In order for there to be uniform breaking-off of coal over the area of the face it is necessary to control the direction of imparting of energy pulses to the pairs of working electrodes situated uniformly over the zone at a distance of 400-700 mm from one another;
-- when there is delivery of energy pulses in the cleavage there will be a pulverization of the coal without its detachment and therefore it is necessary either to change the direction of breakage along mutually perpendicular axes or make provision for combined detachment with the use of another, such as the mechanical method for the destruction of coal and rock;
-- there can be different variants of management of the zone of actual destruction beyond the limits of the working zone of the actuating mechanism.

In conclusion it can be noted that a scientific direction in the creation of new technological and technical solutions in the field of underground mining work is necessary both from the point of view of the present-day needs of the coal industry and also for a scientifically sound prediction of its prospects for the future.

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CSO: 1822/69

UDC 622.33.012.2"Rostovugol'"

DEVELOPING MINING AT OPERATING MINES

Moscow UGOL' in Russian No 11, Nov 83 pp 23-25

[Article by I. D. Posyl'nyy and G. G. Kuznetsov, candidates of technical sciences, "Rostovugol'" Association]

[Text] The "Rostovugol'" Association is one of the largest in the branch. By 1985 the production of coal at the association should reach 17.7 million tons. However, in the 11th Five-Year Plan no provision was made here for the construction and starting-up of new mines. Accordingly, the increase in coal production should be ensured by already operating mines, which requires the implementation of a series of engineering-technical measures for maintaining and augmenting their productive capacity.

The association includes 25 mines and mine administrations (32 technical entities). Among these two mines were put into operation in the pre-Revolutionary period, 9 mines prior to the Great Fatherland War and others in the postwar period. In addition to the large mines, producing more than a million tons of coal annually, there are eight mines with an annual productive capacity of less than 300,000 tons of coal (including four with a capacity of less than 150,000 tons).

As a result of the prolonged period of operation, at virtually all mines the fields on a slope have been worked out, as well as many sloping fields that are at a depth as great as 1,000 m. At a number of mines the working of the remaining reserves has begun at the lower limits of the mine fields by means of vertical shafts. There has been a considerable increase in the depth of working (at 12 mines work is being done at depths of 600-900 m, at 8 mines in the range 400-600 m). More than 60% of the work is being done in rocks with a strength factor $f > 8$ on the scale proposed by Professor M. M. Protod'yakonov. Simultaneously with an increase in the depth of working there is an increase in the extent of the maintained workings, which for the association has attained 1,400 km (at 18 mines the extent of the maintained workings is more than 50 km). There has been a considerable increase in the amount of gas in the mines. In the course of the next two to four years there will be a redistribution of coal production by thickness of the strata; strata with a thickness of more than 1.2 m will be worked out. All this has led to a substantial decrease in the productive thicknesses in the operating mines.

For the purpose of maintaining existing volumes of coal production at operating mines measures have been developed and implemented at the association for augmenting output and lengthening the lifetime of mines which are working out their reserves. This has ensured an increase in output by 2.43 million tons. Below we will mention the principal directions in improvement of underground and surface mine facilities.

LENGTHENING OF LIFETIME OF MINES AS A RESULT OF THE REDISTRIBUTION OF THE BALANCE OF COAL RESERVES. As examples of the realization of this direction we will examine the operation of the "Oktyabr'skaya Revolyutsiya" and "Krasin" mines.

The "Oktyabr'skaya Revolyutsiya" mine was put into operation in 1914 with a planned annual capacity of 450,000 tons and an annual productive capacity of 530,000 tons. The mine exploits two anthracite strata with a thickness of 0.65 m and 1 m. The reserves within the limits of the planned boundaries of the mine field were worked out in 1979. In 1963, in order to prolong the lifetime of the mine, reserves were added on beyond the eastern technical boundary from the field of the "Bessergenevskaya" mine. The construction of the latter was put in mothballs in 1962. In order to develop work on the added-on part of the mine field an air-supply shaft was constructed with a depth of 132 m, as well as a ventilation shaft with a depth of 190 m and a slope. The working of strata was initiated here in 1966 and continued with deepening of the slope until 1981. In 1980 a second shaft was driven and to eliminate the "step" scheme for the transport of rock, delivery of material and people, and also for supplying fresh air the shaft of the "Bessergenevskaya" shaft was widened and deepened by 320 m. All this made it possible to work out the mine field by four complexly mechanized drifts. As a result of the repeated add-on of reserves, in 1978 the lifetime of the mine was lengthened by an additional 20 years. The total expenditures on mining work in the new sector of the mine field were 22.2 million rubles.

The "Krasin" mine was put into operation in 1928 with an annual planned capacity of 210,000 tons. The annual productive capacity of the mine is 580,000 tons. Beginning in 1973, after working-out of the "Nesvetayevskiye" strata the mine proceeded to the working of stratum K_2^n, the "Lutuginskiy" stratum, with a thickness of 0.65-0.8 m. It was proposed that the enterprise be closed down in 1986 with approach of cleaning work under the central part of Shakta city. In order to lengthen the lifetime of the mine it was decided to open the reserves in the free sector along the K_2^n stratum, situated 2 km beyond the technical limit of the mine. A total of 5.5 km of mine workings with a a great cross-sectional area have now been driven, including 2.8 km of cross-cuts and field drifts. In the first stage in the construction plans called for the preparation of a sloping field with start-up of work on two cleaning faces and the replacement of the ventilation apparatus at pit No 2 with a higher-capacity apparatus. Expenditures on the first stage will be 5.3 million rubles. In the course of the second stage plans call for the construction of a vertical air-supply shaft with a depth of 250 m and two ventilation shafts, together with the preparation of a slope workings for four drifts. Expenditures on the second stage will be 13.5 million rubles. As a result of implementation of these measures the lifetime of the mine will be extended for more than 15 years.

RECONSTRUCTION AND MODERNIZATION OF TECHNOLOGICAL LINKS. With an increase in the depth of the mine workings bottlenecks will arise in some technological links limiting the development of the mines and increase in their output. The elimination of bottlenecks will be accomplished by the implementation of a major reconstruction and modernization of individual links. For example, during recent years there has been reconstruction of three mines with a total increase in capacity of 1.27 million tons.

The "Mayskaya" mine was put into operation in 1954 with an annual planned capacity of 600,000 tons. Two anthracite strata are being worked. Favorable geological mining conditions favored the rapid increase in mine output, and already by 1964 the output of coal had increased to 1.3 million tons annually. However, as a result of this, the inclined field and the first thousand meters of the sloping field were worked out. Serious difficulties arose in the operation of transport, the raising of coal and ventilation.

The mine was reconstructed in 1965-1971 for the purpose of improving mining work and augmenting productivity. A skip shaft with a depth of 650 m was driven and outfitted in a new industrial area at a distance of 1,100 m from the operating industrial area. In addition, here a complex was constructed for the reception and unloading of coal and rock, a ventilation apparatus was installed and a railroad siding was constructed. Two flanking ventilation shafts with depths of 440 and 540 m were constructed and three slanting fields were prepared. The cleaning faces were supplied with planing apparatus with individual and mechanized timbering in place of the used side-cut machines and wide-reach combines. The administrative-living combine, boiler plant and cleaning structures were reconstructed. Already two years after reconstruction the output of coal at the mine during the year attained 1,817 million tons (annual planned capacity -- 1.8 million tons), the daily load at the cleaning face was 1,308 tons, the productivity of work per worker in production was 67.1 tons/month. The expenditures on reconstruction were 18.4 million rubles.

The "Glubokaya" mine was put into operation in 1955 with an annual planned capacity of 800,000 tons. Two anthracite strata with thicknesses of 1 and 1.5 m are being worked. After an increase in the depth of working by more than 700 m in 1962 the quantity of air for ventilating the mine workings became inadequate and the temperature in the shaft rose to 30°C. For the normalization of work and increasing productive output of the mine its reconstruction was begun in 1962. Provision was made for: construction of two vertical ventilation shafts with a depth of 700 m each for a changeover to flank ventilation and a vertical skip shaft with a depth of 700 m and tower above; expansion of the yard around the shaft; increase in the capacity of the boiler plant; outfitting of the cleaning faces with mechanized complexes. In 1967, after ending construction of the ventilation shafts, the ventilation of the mine was considerably improved. This made it possible to proceed to improvement in the mining work and the introduction of mechanized complexes. During the subsequent three years in all the inclined fields there was a changeover to a shaft system for working the mine and the use of KM-87 complexes was initiated. Reconstruction of the shaft was completed in 1981 with the introduction of a new skip shaft with a tower headwork. The total expenditures on reconstruction of the mine were 23.1 million rubles. The improvement of mining work at the "Glubokaya" shaft favored an increase in the annual productive capacity of the mine from 0.8 to 1.05 million tons (coal output volume

from 733 to 1,111 thousand tons annually); daily load on drift -- increase from 222 to 846 tons; work productivity per worker in coal production -- increase from 222 to 846 tons; work productivity per worker in coal production -- increase from 29.5 to 62.5 tons/month.

The "Sambekovskaya" mine prior to reconstruction consisted of two shafts with an annual planned capacity of 150 thousand tons each, constructed by the "fast" method in 1955. One anthracite stratum with a thickness of 0.85-0.9 m is being worked. Both mines were opened by slant shafts with cable haulage at the end. By 1968 the reserves at the mines were worked out to a depth of 900 m along the stratum dip, which led to the necessity for establishing stepped slopes.

In order to improve mining operations and increase mine productivity, in 1973 the decision was made to reconstruct them. The main idea of the reconstruction was the joining of mines Nos 26 and 27 by mine workings, elimination of the stepped structure of transport, concentration of the delivery and unloading of coal at the surface of mine No 27. In order to accomplish this provision was made for: construction of a main slanting conveyor shaft in the mine head area of mine No 27 with a total length of 2,200 m and a surface complex; in this same work area construction of a vertical auxiliary cage shaft with a depth of 630 m, a complex of buildings and structures above the mine; driving of a cross-cut with a length of 1,800 m from the auxiliary shaft for penetrating the stratum to be worked below the level where cleaning work is being done and preparation of a slope field; construction of two main ventilator systems in the former slant shafts of mines Nos 26 and 27 for the organization of flank ventilation; running of a major drift with a length of 3,700 m connecting the mine workings of both mines at a depth of 620 m; preparation of slant panel No 1 and construction of living quarters for the workers.

Reconstruction work was initiated in 1974 and was to be completed in 1983. However, due to technical and organizational measures adopted by the workers of the "Rostovugol'" Association and the "Rostovshakhtostroy" combine, the reconstruction of the mines was completed in 1981. Already in 1982 this made possible an almost twofold exceeding of the planned productivity of mines Nos 26 and 27 prior to the reconstruction. For the years immediately ahead plans call for increasing the annual volume of coal production to the planned goal of 900,000 tons. The total expenditures on reconstruction were 56.7 million rubles.

The major reconstruction carried out at the three mines of the "Rostovugol'" Association made possible a complete renovation of their mining operations, introduction of good order into the surface technological complexes and creation of conditions for stable operation of these coal production enterprises. Nevertheless, such a reconstruction is economically and technically feasible only when there are coal reserves for a long time to come, which is by no means the case at all mines. In addition, the inadequate capabilities of the "Rostovshakhtostroy" combine give rise to a prolonged time required for reconstruction; the specific capital investments per ton of increased productivity have increased sharply during recent years due to the overall increased costs of construction.

In order to obtain a more rapid return with respect to increased capacity with the minimum possible capital investments, at the "Rostovugol'" Association there is an on-going modernization of the mines (improvement in the individual technological links). The nature of the measures carried out for the modernization of technological links can be represented in the example of the following mines.

The "Vostochnaya" mine was put into operation in 1964 with a planned annual production of 750,000 tons. Two strata with thicknesses of 0.85 and 1.1-1.8 m are being worked. The mine field has been penetrated by two central-paired vertical shafts with a depth of 220 m. By 1973, when the mining work was proceeding at a considerable distance from the shaft entrance area, difficulties arose in the mine with the ventilation and transport of loads through the mine workings and hoisting up the lift. In order to improve ventilation with the existing main ventilator systems, in the flanking ventilation holes there was a changeover to a system of working with long pillars along the rise with straight-through ventilation, and there was a more rational distribution of the quantity of air between the ventilation systems and a reduction of internal air leakage. There was a broadening of 630 m of mine workings and 10.5 km of old workings were sealed off. The productivity of underground transport and the lift was increased as a result of replacement of the dumper in the area surrounding the shaft by a dumper with a greater handling capacity; the holding capacity of the lift was increased from 4.7 to 7.1 m^3 and the diameter of the cable for the lift was increased from 33 to 35.5 m (the pulleys on the pile driver, the lift loading apparatus and the reducer for the lift were replaced and on the main lift both motors operated in-parallel); the 8ARP locomotives were replaced by 2AM-8 and 13ARP paired electric locomotives; there was an increase in the handling capacity of the surface unloading complex for the lift shaft. The total expenditures on modernization were 750,000 rubles. The annual productive capacity of the mine was increased by 80,000 tons.

The "Ayutinskaya" mine consisted of four shafts, put into operation in 1925-1926. Their total planned annual production was 900,000 tons. In the 1960's the mines were joined by mine workings into an integrated mine complex as a result of the driving of a diagonal slant conveyor shaft with a length of 1,000 m. The annual productive capacity of the mine attained 960,000 tons. The second thousand meters of the mine field along the dip of the stratum was worked out at this rate. Further implementation of mining work under the existing technological plan would inevitably lead to a complicating of the transport system and the scheme for ventilating the mine. The required coal reserves did not exist for a major reconstruction of the mine. Accordingly, it was decided to modernize it with the minimum possible expenditures. In 1967 work on mine modernization was begun. The plan provided for deepening of the main diagonal slant conveyor shaft and the slant auxiliary shaft by 1,000 m along the stratum dip; construction of a work area around the shaft at a new horizon; construction of a vertical air-delivery shaft with a depth of 490 m at the center of the mine field; drilling of three ventilation holes with a diameter of 1.8 m and a depth of 500 m (two paired at the center of the mine field and one at the flank); shifting of the ventilation of excavated fields to "flank" ventilation; construction of a new administrative-residential complex. In 1972 modernization work was completed and already in 1973

the increment in mine productivity called for by the plan was realized and was 200,000 tons of coal annually. The total expenditures on modernization were 8.9 million rubles.

THE TECHNICAL REOUTFITTING OF OPERATING MINES IS ONE OF THE PRINCIPAL DIRECTIONS IN MAINTAINING AND AUGMENTING THEIR PRODUCTION CAPACITY. At the "Rostovugol'" Association it is being accomplished for the most part as a result of use of scrapers capable of working thin and moderately thick anthracite strata and also mechanized timbering adapted for work with scrapers. The technical reoutfitting of mines at the "Rostovugol'" Association developed most intensively in the Ninth Five-Year Plan. For example, during 1971-1975 the annual volume of output by mechanized complexes increased from 1.6 to 9.7 million tons or by a factor greater than 6. During the Tenth Five-Year Plan work continued on the introduction of scrapers of improved Soviet (SO-75, SN-75, USV) and foreign types, and also modified narrow-reach combines (2K-52, 1K-101, 1GSh-68) and mechanized timberings. By the end of the five-year plan the volume of output by mechanized complexes had increased to 12.3 million tons annually, which was 67.3% of the total cleaned output.

As the many-sided mechanization of coal excavation has been introduced there has been improvement in mine operations. For example, the percentage of pillar systems for the working of mines with back-excavation along the strike and rise of strata increased from 38% in 1970 to 77% in 1980. There has been a considerable increase in the level of concentration of mining work. The mean daily load in the drift during this time increased from 300 to 382 tons and the number of active cleaning faces was reduced from 211 to 152. The work productivity of a worker in coal production increased from 39.7 to 43.2 tons/month or by 8.9%.

Thus, the work experience of the "Rostovugol'" Association in the development of mining work shows that with a creative approach to solution of the problems involved in improving mining operations in operative mines it is possible not only to maintain but also to increase their productive capacity and to considerably lengthen their lifetime, at the same time improving the technical-economic work indices.

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CSO: 1822/69

ALTERNATE FUELS

PROSPECTS FOR WIND POWER IN ARMENIA SURVEYED

Yerevan KOMMUNIST in Russian 26 Oct 83 p 2

[Article by V. Markaryan, deputy director for science, ArmNIIE (Armenian Scientific Research Institute for Energy) and R. Sarkisyan senior scientific associate: "Wind Energy is Gathering Speed"; passages enclosed in slantlines printed in boldface]

[Text] The earth's fuel and energy resources are limited. Even now, some regions are expriencing shortages of them. In addition, the use rates of liquid and gas fuel as raw materials for the processing industries are increasing. This means reductions in their share in the fuel and energy balance.

Since the beginning of the 1970's a number of developed nations have begun the development and implementation of long term energy programs which give more importance to renewable energy resources -- the energy of the sun, the wind, the heat in the earth's interior, etc.

A widespread interest in wind energy can be observed in many nations. There is clearly a tendency for wind energy installations (WEI) to become larger, as this reduces construction costs and the payoff period of the station.

In addition to traditional approaches, specialists in various nations are developing original designs and proposing bold engineering solutions, for example, a system to use the wind's energy at heights of 10 kilometers. The constant and powerful winds here will permit the use of devices with a 10 kWh capacity.

A fundamentally new type of unit -- the vortex aerogenerator -- capable of considerably increasing unit capacity, is now being developed. Such a unit can work in a weak wind and even when there is no wind, as long as there is a temperature difference of 10 degrees between the bottom and top of the tower.

The use of wind energy saves scarce organic fuel. It is also absolutely "clean", not releasing any harmful emissions into the environment.

Just what is delaying its extensive introduction? It is above all the high cost of the energy produced, the large area needed for the construction of

wind energy facilities, the noise made by such units, which can have a substantial effect upon the fauna in adjacent areas, and the interference with TV and radio.

These must be taken into consideration. Nevertheless the prospects for the use of wind energy in a number of industrially developed nations is estimated to be quite high.

The USSR began to develop wind energy in the 1920's. In 1931 a 100 kWt unit was built in the Crimea, and in 1938 work began on the installation of a 5,000 kWt unit, a giant for its time, on the summit of Ay-Petri. However, it was not completed.

/In our nation intensive work is now under way on WEI of the most diverse design and function. More than 10 types of low power units have been developed, primarily for agricultural purposes./In some regions units with capacities ranging from 400 to 1,250 kWt are being built. One original suggestion is their construction on hydroelectric dams. This could produce tens of thousands of kilowatts of additional power.

/The use of non-traditional, renewable energy sources, in particular wind energy, is an urgent problem, especially for our republic, which is not rich in energy resources. The ArmNIIE is evaluating the energy potential of wind in the republic, determining sites and advisable scales of long term introduction for use in the economy./

Unfortunately, the lack of a detailed wind energy survey for the Armenian SSR is very much hindering the accurate determination of the wind's energy potential. /A preliminary analysis of the results from a three hour observation of wind speed at all the meteorological stations in the republic shows that at only six stations (Pushkinskiy Pereval, Aragats, Sisianskiy Pereval, Yanykh, Lake Sevan and Kochbek) is the average annual wind speed within the range recommended by Soviet and foreign specialists for wind energy production./

When consideration is given to terrain conditions unfavorable to the construction of WEI and to the poor economics of constructing sets of them in the republic, the real annual economic effect which could be obtained in Armenia is 20-30 percent of the theoretically possible figure, that is 80 - 120 million kWt.

/Thus, the use of wind energy in the republic would make possible an average annual savings of 270,000 - 400,000 tons of organic fuel (gas and mazut)./

The units upon which it is intended to base wind energy development in the republic (rotor diameter not more than 24 m, operational at wind speeds of 5-15 meters per second, power output 10-300 kWt) are suitable for work without being tied into the energy system. This means they can be used for local energy consumption and agricultural needs: mainly for the electrification of livestock farms in remote mountain regions, for irrigation, etc.

/In the long term, larger, improved WEI, producing 1000 and more kWt will be able to operate within the energy system. This will make possible the more efficient use of equipemnt and save large amounts of organic fuels./

Problems in studying the potentials of wind energy in the republic and its use in power production are still at the beginning stages and require serious attention from many organizations to ensure its extensive economic introduction.

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CSO:1822/96

ALTERNATE FUELS

ACADEMY OF SCIENCES OFFICIAL URGES GREATER USE OF GEOTHERMAL ENERGY

Ashkhabad TURKMENSKAYA ISKRA in Russian 2 Oct 83 p 2

[Article by I. Dvorov, deputy chairman, USSR Academy of Sciences Council on Geothermal Research: "The Earth's Heat -- in the Service of Humanity"]

> [Text] Implementing the decisions of the 26th CPSU Congress on expanding the study and use of geothermal resources, on 3-4 October 1983 in Ashkhabad, the USSR and the Turkmen SSR Academies of Science conducted an All-Union Conference on the theme: "Geothermal Research in Central Asia and Kazakhstan". The "Basic Directions for the Economic and Social Development of the USSR during 1981-1985 and for the Period up to 1990" state: "Increase the scales of the national economy's use of renewable sources of energy (hydro, solar, wind, geothermal). This is a very important task as such types of energy are less costly and obtaining them does not require the combustion of fossil fuel. Because of this, the interest of scientists and production workers in renewable sources of energy is steadily increasing. I. Dvorov, deputy chairman of the USSR Academy of Sciences Council on Geothermal Research, discusses one such source -- geothermal.

Geothermal research is now given great attention in the USSR. It has received especially widespread development in the past 15-20 years. Fundamental and applied geothermal problems are being solved by scientific-research institutions in the Academies of Science of the USSR and the union republics, and by many ministries and departments.

Geothermal conditions in our nation are extremely diverse. In volcanic regions (Kamchatka, the Kurils) the temperatures of rocks and water even on the surface can reach 100°C. On the other hand, throughout the widespread permafrost zone, temperatures at a depth of 2,000 meters and greater frequently do not exceed 4-10°C. In the Moscow region temperatures at a depth of 1,500 m do not exceed 40°C, while at similar depths in the North Caucasus they are twice that. According to data from the USSR Academy of Sciences and the USSR Ministry of Geology, the predicted reserves of thermal waters with temperatures in the 40-200°C

range and mineral content of up to 35 grams per liter at depths in the 3,000-3,500 m range amount to 22-24 million cubic meters per day. If the heat from such waters is used at an efficiency of 0.5 this is equivalent to 40-45 million tons of standard fuel. If these thermal water deposits are developed using methods for maintaining reservoir pressure by injecting the withdrawn water back into the reservoir, as petroleum workers often do, the energy yield from predicted reserves reaches 150 million tons of standard fuel annually.

Geothermal resources can be divided into several groups with respect to their heat resources. Low potential thermal waters with temperatures of up to 100°C (they are 90 percent of our nation's resources) find use in space heating and hot water supply for residential, agricultural and industrial buildings and for all sorts of production processes.

The most economical use of low potential thermal waters is for heating greenhouses. The range of their use in our nation is very broad -- from the subtropics to the polar regions.

As is known, greenhouses make it possible to raise 2-3 crops per year in the middle latitudes of the nation and to obtain 20-25 kg of produce per square meter, 12-15 fold more than can be raised on open ground.

The main costs in raising produce in greenhouses go for heating the facility. They are at least 60-70 percent of production costs. The overall production costs of hothouse produce are quite high -- more than 60 rubles per quintal. In the middle latitudes of our nation a 10 hectare greenhouse facility requires as much heat as is used for the service and communal needs of a modern city of 60,000 - 70,000 inhabitants. Huge amounts of fuel are burned in the boilers of such a facility. There is no future in this way of expanding greenhouse operations. The use of geothermal waters results in a considerable savings and conserves traditional fuel.

More than 70 elements are found in dissolved form in geothermal waters. They are often in high concentrations, making such waters a valuable raw material, a unique "liquid ore" for the chemical industry. It is known, for example, that geothermal chloride solutions contain, in addition to chlorides of sodium, potassium, magnesium and calcium, a huge range of metallic and nonmetallic trace elements. All of the iodine and 70 percent of the bromine produced in the USSR is extracted from geothermal brines.

A unique deposit of geothermal brine is located on the Cheleken Peninsula in the Turkmen SSR. Iodine and bromine were extracted here back in the beginning of the century. Nobel, the well known entrepreneur, who had oil fields in Baku and the Trans-Caucasus, drilled several shallow wells here and, obtaining large flows of iodine brine, organized small, primitive production operations for extracting iodine and later bromine. Now there is a large, modern equipped enterprise at Cheleken.

The brines at Cheleken reach temperatures of 90-105°C at the bottom hole. In addition to the high content of iodine and bromine there are also trace elements such as rubidium, lead, zinc, copper, cadmium, arsenic and strontium.

Almost all geothermal waters are, as a rule, curative. Highly effective treatment with such waters and their widespread use in balneology are characteristic features of sanitarium and spa operations in the USSR.

In our country there are about 250 known deposits having a total flow of about 300,000 cubic meters daily, suitable for balneological purposes. More than 100,000 cubic meters of this flow have been approved as reserves. The number of mineral water bottling plants is increasing.

The republics of Central Asia and Kazakhstan are exceptionally rich in geothermal waters. Take, for example, Kopet-Dag. In the hydrogeological literature, a line drawn from Kazandzhik to Ashkhabad and further along the foreranges has long been known as the Kopet-Dag Thermal Line. Along it many springs have been discovered with temperatures which exceed average annual ambient temperatures by 5-20°C. The Archman Spring is 28°C and the Bakharden Underground Lake 33-35°C. A number of wells drilled close to the thermal zone have temperatures of 28°C. Waters in this zone are most often weakly sulphuric (Archman), have diverse chemical compositions, are weakly mineralized and, as a rule, have a high rate of flow.

It is a feature of Kopet-Dag geothermal waters that here one generally encounters iodine and bromine containing waters with relatively low mineralization. The iodine and bromine waters of Kopet-Dag can be used in many ways: for balneological purposes and at industrial facilities, where valuable chemicals can be extracted.

As is known, greenhouse operations heated by geothermal waters do not use heat evenly; they consume less in the day than during the night. In southern areas they do not operate in the summer. Heat from greenhouse operations can be used at refrigeration facilities. The joint construction of greenhouse and refrigeration facilities in unified energy blocks is therefore an especially promising idea. Steady flow of deep heat completely eliminates the need for expensive cooling installations and saves fuel for the national economy.

An absorption lithium bromide refrigeration unit with a capacity of 2.5 million kilocalories per hour is now being made in our nation. It can operate not only on electrical energy, but also on the heat from geothermal waters. This unit is notable in that it not only is a refrigerator, but is also a heat pump. It can work year around, cooling in the summer and heating in the winter. It is especially valuable for cooling in the republics of Central Asia and in Kazakhstan, where geothermal resources are quite plentiful.

Just what are the problems and difficulties encountered in the use of geothermal resources? Among the main ones is corrosion and wear of well casings, pipes and other metal items. Such damage is caused by corrosive elements and gases in these waters.

Salt deposition is a serious difficulty in the development of a whole series of geothermal deposits. It often leads to heavy depositions on heat supply pipes, especially if calcium carbonate is present.

There are often environmental problems in the operation of large geothermal deposits and in large discharges of waste waters. The discharge, into open

bodies of water, of such waters presents specialists with complex technical problems if the waters contain compounds harmful to life (phenols, hydrogen sulfides, increased concentrations of salts). For a number of reasons there is no single answer to this problem, as geothermal waters have variable and quite diverse compositions of toxic ingredients.

The inertia of public opinion is a substantial barrier on the way towards the accelerated development of geothermal energy. In particular there is the old idea that traditional fuels (coal, oil, gas), having been successfully used for many decades, will continue to be inexhaustible.

The use of the earth's heat as a cheap source of energy will make possible a more successful solution to problems in heating and cooling cities, heat supply to production process and agriculture. This will undoubtedly help in working out the Food Program.

In conclusion it should be stated that the study and use of geothermal waters is going very slowly. This conference will, undoubtedly, direct the serious attention of many scientific and production organizations toward the further use of geothermal waters in the republics of Central Asia and Kazakhstan.

The earth's deep heat is enormous. It is constantly being renewed and, with proper exploitation, is practically inexhaustible.

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CSO:1822/96

ALTERNATE FUELS

SMALL SCALE SOLAR WATER HEATERS INTRODUCED IN TURKMEN SSR

Ashkhabad TURKMENSKAYA ISKRA in Russian 27 Oct 83 p 4

[Article by TurkmenINFORM: "Solar Energy -- The Wealth of the Desert"]

[Text] The first group of economical solar water heaters has been produced in Turkmenistan. The Solntse Scientific Production Association of the TSSR Academy of Sciences began the series production of the solar installation. It has a solar boiler in the form of a darkened metal container housed within an insulation layer in a glass box. Even on a relatively cool sunny day it can produce 150 liters of hot water. The Sovet Turkmenistany Kolkhoz in Gyaurskiy Rayon and the Bezmein Truck Transport Enterprise, the first to receive the new units, have highly praised the innovation. The prime cost per cubic meter of hot water does not exceed 50 kopecks. This is one-fourth the cost for a water heater burning traditional fuels. It is planned to install 1,000 such units in the republic's villages prior to 1985. They will save up to 5,000 tons of high heat value fuel annually. The economic effect is estimated at 3 million rubles.

The extensive economic use of solar energy is one of the main problems which Turkmen scientists are solving. They have made recommendations on the use of solar energy for heating and cooling buildings, electrifying remote villages and shepherds' camps, desalinating saline water, raising green fodder in the desert, efficiently drying fruits and for industrial uses. The list of new uses for the sun is rapidly growing. It includes pumping water from deep wells, the super pure smelting of metals and raising vegetables and fruits in solar greenhouses with a closed water cycle.

Scientists think that in the future the sun will provide more than half of the energy needs of agriculture and other sectors of the economy located in the desert.

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CSO:1822/96

DELIVERY PROBLEMS DELAY CONSTRUCTION AT BALAKOVO AES

Moscow SOVETSKAYA ROSSIYA in Russian 1 Dec 83 p 3

/Article by A. Krotov, minister of power machinebuilding: "Deliveries Must Be Made on Schedule!"/

/Text/ The 10 August issue of SOVETSKAYA ROSSIYA published a letter entitled "Futile Shifts" from the construction project of the Balakovo AES. The installation-group brigade leaders A. Baginskiy, M. Dityuk, and A. Okulov reported that the assembly and installation of the first power unit's equipment have been delayed by the supplier-plants. The authors directed a request at their partners to make up their liabilities and strictly observe the schedule for shipping out assemblies and parts. The editors have received a number of official replies. A repeat check-up, however, has shown that certain responsible officials have turned out to be more generous with their promises than with genuine help. The newspaper talked about this in the remarks entitled "Replies...without a Response," published in the issue of 20 October. And here is a new reply from the Ministry of Power Machine Building, dated 17 November.

"The report entitled 'Replies...without a Response' was discussed on 24 October of this year at an expanded session of the collegium of the Ministry of Power Machine Building with the participation of the general directors of the production associations and the directors of enterprises. The criticism was acknowledged to be correct.

"Completing equipment deliveries for the first unit of the Balakovo AES is provided for in the first quarter of the coming year. Enterprises of the Ministry of Power Machine Building have been issued appropriate directives with regard to the up-to-date preparation of production and guaranteeing the output of equipment within the planned time periods. With respect to the specific items which were mentioned in the newspaper, the following shipment times were established:

"The Atommash Production Association will ship out 3 of the 5 gate valves in December and the remaining 2 during the first quarter of 1984.

"The Krasnyy Kotel'shchik Production Association has shipped out 10 units of heat-exchanging equipment, and 2 more units will be delivered in November. For the turbine-regeneration system one unit of equipment has been shipped out, and another one will be delivered in November of this year.

"The Podolsk Machine-Building Plant imeni Ordzhonikidze has shipped 3 heat-exchangers to the Balakovo AES, and 2 more will be sent out in November of this year.

"Out of 1376 tons of pipelines, the Belgorod Power Machine-Building Plant has delivered 1184 tons to the Balakovo AES, while the remaining 192 tons will be shipped out in November--December 1983, as pipes are received from enterprises of the USSR Ministry of Ferrous Metallurgy.

"The Sibenergomash Production Association has shipped out all 4 condensate tanks.

"The collegium indicated the irresponsibility of the leading officials of the individual associations and enterprises specified as having failed to meet the deadlines for shipping out equipment and named in Deputy Minister V. G. Pershin's reply to the letter of the installation brigade leaders. For insufficient monitoring controls over the observance of deadlines for deliveries for the AES by their sub-departmental enterprises the chief of the Atomic Machine-Building Administration, V. G. Sotsenko, and Deputy Minister V. G. Pershin have been strictly admonished."

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CSO: 1822/97

INFORMATION, PROGRESS REPORT ON PAKSH AES

Moscow PRAVDA in Russian 3 Nov 83 p 4

/Article by Katalin Boshshani, correspondent of the newspaper NEPSZABADSHAG: "The AES near the Village of Paksh: "Facets of Cooperation"/

/Excerpts/ "Paksh is a milestone construction project not only for the Hungarian economy but also for cooperation among the CEMA countries," we were told by a plenipotentiary of the HPR /Hungarian People's Republic/ Ministry of Industry, Attila Lyorintsi. "This is the first integrated AES. Its creation is based on a multilateral agreement among the fraternal socialist countries concerning production specialization and cooperation in atomic power machine building. The plan was created in Kiev. The VVER-440 reactors have been manufactured at the Czechoslovak Skoda Combine in accordance with Soviet documentation and with the participation of Soviet specialists. Their 220-MW turbines have come from Kharkov. Uralmash and other plants of the Soviet Union have supplied us with steam generators, pumps, a number of large machine units, instruments, and electronic equipment. Specialized cranes bear the trademark of the GDR. Poland has supplied us with heat exchangers, and its builders have worked on many facilities of this AES. Bulgarian enterprises have concerned themselves with the protective apparatus. All the equipment, including the Hungarian, has shown itself to the best advantage and has passed muster."

As A. Lyorintsi notes, the proportion of Hungarian output increased throughout the course of the construction, and by the end it came to half the cost of the machine and technological equipment. From among the many native Hungarian enterprises we must single out, above all, the Gants-MAVAG Combine. It was there, based on Soviet documentation, that they mastered the output of 20-meter, telescoping arms which function as robot-manipulators with the precision of a millimeter and perform the operations of reloading the cassettes in the active zone of the reactor. On the basis of the agreement on specialization, these units are being turned out serially for the other CEMA countries as well. The Lang Plant has begun to produce heat-exchanging apparatus and special tanks for spent nuclear fuel. Our Soviet partners have formed a good opinion of Hungarian cooperative deliveries, and in ensuing AES units our participation will increase even further.

In the practice of power engineers there is such a concept as the following about the readiness of a project: "equipment in operation." On 11 August the Soviet specialists of Atomenergoeksport handed over to the Hungarian users the first unit of the AES.

"The start-up commission of the construction granted permission to include Paksh in the nationwide electric-power network, though by this time the station had already provided the country with more than a billion kW-hrs of electric power," stated Layosh Bayor, secretary of the start-up commission. "We were able to reach the stage of 'Equipment in operation' three months earlier than the calculated time."

And we were accorded yet another interview in the HPR Electric Power Trust. The director for production, D. Lendel, declared the following:

"We calculated that by the end of the year the AES in Paksh would produce 1.6 billion kW-hrs, but, since the equipment is operating without interruption, 2 billion will be obtained. This will replace 400,000 tons of petroleum. At the Danube and Tisza Thermal Stations we are curtailing the operation of two units and are holding them in reserve. That amount of petroleum which will not be burned thanks to this will be sent for refining to the new cracking unit in Sazkhalombatt. This will enable us to obtain 10 percent more gasoline and diesel fuel. Such a structural modification over the course of the next few years will bring the republic billions and billions of forints in savings. It is planned that by 1990 Paksh, having achieved a capacity of 1,760 MW, will already satisfy one-fourth of Hungary's entire needs for electric power."

2384
CSO: 1822/97

SOTSIALISTICHESKAYA INDUSTRIYA DETAILS ATOMMASH DEVELOPMENTS

Contribution of Workers

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Nov 83 p 2

/Text/ The holiday edition No 45 (253) "Sotsialisticheskaya Industriya at Atommash" opens with the speech of brigade leader A. Shabale from Kavelektromontazh /Caucasus Electric Installation Organization/. The author writes that "greeting international holidays with successful labor has become a good rule for us. The 66th Anniversary of the October Revolution is approaching and once again each of us is working especially hard and preparing our labor gifts. The collective of our sector has raised the daily output to 126 percent in the installation of equipment in the first building."

The newspaper is informing everyone about the labor accomplishments of the builders and operators in honor of the celebration.

An election Party conference was held at Atommash. The newspaper contained the report about the meeting of the plant communists.

Under the title "Step After Step" the newspaper contained a story about the leading brigade leader of cutters from the lay-out and preparing shop No 1, M. Gribanov.

"Recipe for Health" - such is the unusual document following a careful medical examination that was given over the past year to nearly 300 patients at Volgodonsk polyclinics. In the article "If You Want To Be Healthy" the chief doctor at the treatment and physical culture dispensary, T. Perekhodov, reports that they are now developing a city-wide comprehensive "health" program.

The newspaper acquaints readers with new developments in culture and everyday events, and with sports information.

Komsomol Watch

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Oct 83 p 2

[Text] The No 44 (252) edition "Sotsialisticheskaya Industriya at Atommash" opens with a report on the results of the communist

subbotnik. The builders and operators have worked diligently and with honor at the plant.

On 29 October they celebrate the birth of the Komsomol. This date is being extensively celebrated in the young peoples' city of Volgodonsk. Nearly 10 years have passed since the Komsomol decided to declare the construction of the atomic machine building plant to be an all-union shock Komsomol construction project. The first secretary of the Volgodonsk Party Committee of the Komsomol, G. Aleynikov, in his article "Always in the Lead" tells of the praiseworthy pages in the annals of Atommash and of the remarkable deeds of the Komsomol members. Now at each project and in all shops the young people are working under the slogan "Komsomol energy to the plans of the five-year plan".

The collective of the house building combine has within a short period of time achieved a signfficant reduction in losses of work time. What has the party organization done to reduce stand-downs and strengthen labor discipline? In his article "Comprehensive Approach", Ye. Nemtsov, the secretary of the party committee, responds to this question.

V. Navozov's article "How to Save the Computer?" is dedicated to an important topic - the accomplishment of a unified policy of adopting an automated control system (ASU) at Atommash.

Continuing under the rubric "How Are You Being Served?", the newspaper offers an article "Waiting for the elevator". The reader will find in this issue answers to the critical presentations of the newspaper and a letter to Kuzma Volgodonskiy, "We are carrying water in a sieve.".

Prior to Finish

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Nov 83 p 2

/Text/ At the start of this year the Volgodonskenergostroy Trust concluded several contracts with their compatriots for a competition on the "workers' relay race" principle. The year is coming to an end and it will soon be time to add up the results. In No 46 (254) "Sotsialisticheskaya Industriya at Atommash" there is an article entitled "With what are we proceeding toward the finish line?"

"At this point in time we can say something about the efforts of the collective of the Production Association Kuybyshevenergostroyprom. This enterprise, writes member of the coordinating council on the construction of Atommash and the Rostovskaya AES, Ye. Khaustov, is doing a good job of keeping up with deliveries of prefabricated reinforced concrete. The Central Urals Metal Structures Plant, the Production Association Dneproenergostroyprom, the Volgograd Construction Materials Plant and the Voronezh Iron Hoop Plant are doing a good job of meeting their obligations.

At the same time, the article points out, there has been an increase in the number of enterprises which fail to deliver on schedule. These include the Kharkov Timber and Lumber Combine, the Serovskiy Experimental Timber Combine, the Production Association Kamgesenergostroy /Kama Hydroelectric Power Station Construction Organization/, the Bystrorechenskoye and Kepnyanskoye Open Pit Mining Administrations and others. All of the compatriots of the giant plant are to work under the slogan "All Atommash orders on schedule".

Under the rubric "Practice of Ideological Work" in this issue there is an article by the Director of the Volgodonsk Branch of the NPO /Scientific-Production Association/ Atomkotlomash /Atomic Boiler Machine Building/ and Chairman of the Board of the City Organization of the Znaniye Society, V. Kostenich, entitled "We Keep Our Lord". The author sees the main task of the lecture propaganda in its maximum specificity and its proximity to those problems which are being resolved at the construction site and in the production facility.

In continuing the rubric "Labor Productivity is the Key Indicator" the newspaper under the title "Salary Must be Earned" carries the speech of the Chief of the Scientific Organization of Labor, Wages and Management for Atommash, Ye. Voronkov. Under the rubric "Start-up Projects Put Into Operation" the newspaper contains the report "Truncated Variant" and an article by the shop chief for the repair of technological equipment at Atommash, O. Krutovoy, "A Tung Upward."

The reader will be able to familiarize himself with the answers to the critical commentaries of the newspaper and with the letter to Kuzma Volgodonskiy "Sincere Inadequacy", and with news on cultural events, everyday events and sports information.

8927
CSO: 1822/60

NON-NUCLEAR POWER

SOLAR POWER STATION CONSTRUCTION REPORT

Moscow SOVETSKAYA KUL'TURA in Russian 23 Jun 83 p 8

/Article by V. Torgayev: "A Trap for Light: In the Soviet Union the First Solar Electric Power Station is Being Built"/

> /Text/ The concept of renewable energy exists. It can provide mankind with energy for hundreds and hundreds of millions of years. It is the force of water, which turns the turbines of hydroelectric power stations, the wind, and finally the Sun. Their energy is eternal just as the earth and sun, for it is given life by them. It is no accident that at the June (1983) Plenum of the CPSU Central Committee it was noted that among the major problems, the importance of which continues to increase, is the mastery of new sources of energy. A leading place in this undertaking is occupied by solar energy.

Several years ago, while visiting the Energy Institute imeni G.M. Krzhizhanovskiy, I saw the first steps in solar energy. They were embodied in the design of a solar electric power station, which was developed by the specialists of this scientific center. It should be noted that not so long ago the helictechnicians were seen as eccentrics chasing after "sunrays" with their enormous mirrors. Today this scepticism has given way to real optimism because the work of recent years has shown that the scientists have succeeded in coming up with several interesting engineering solutions and have proven in action the possibilities of the "golden ray".

And so the ideas of using solar energy have begun to be put to use. The contours of the enormous construction site have appeared today near the settlement of Lenino, located near the Arabatskaya Strelka on the Crimean peninsula. Here the specialists have started to construct the Soviet Union's first solar electric power station.

What will this "trap" for the sun, or as it is officially called the SES-5, be like?

The deputy director of the institute, Doctor of Technical Sciences R. Akhmedov, reports, "Let us introduce the open-work metal tower which has already been raised to its 70 meter height. On its top will be installed a boiler of sorts - a steam generator. Around the tower there will be mirrors in concentric circles - these are the heliostats. Some 1,600 heliostats will be installed. The mirror surface of each will be 25 square meters. Four hectares of solid mirror - such will be their combined area! The rated capacity of this first solar power station will be 5,000 kilowatts."

Of course, based on today's scale this power station is on the small side. But let us remember that the first atomic electric power station, which was built 30 years ago in Obninsk, had the same rated capacity.

The most unusual feature of the operation of the power station's heliostats is the synchronous tracking of the light source. Each of the mirrors, just as if it were a living being, does not permit the sun to leave its field of vision, in spite of the fact that the sun moves about the heavens and even changes its altitude above the horizon depending upon the time of year.

The designers have placed the heliostats so that they do not cast shade upon each other; and they have also found a way to control them. The computer will become a sort of "leader", into the memory of which a special program is fed every day. Signals from the computer will be transmitted to the mechanisms which control the mirrors; these mechanisms will execute all commands. The specialists have made use of devices capable of controlling the precision of the mode and constantly maintaining both the sun and the tower on target at all times.

The sun's rays, which are directed at the tower from all sides, heat the water in the steam generator to a temperature of 250 degrees. Then the steam releases its energy to the turbine, which turns the electric power generator.

When bad weather arrives provision has been made for an enormous thermal battery. A portion of the hot water will be used to produce electricity and a portion will be stored for later. Although the battery is called a thermal battery, the water in this 1,000-ton reservoir will be in a so-called reheated condition. When bad weather sets in the water is converted to steam, which will provide its energy to the turbine.

R. Akhmedov continues, "The primary task of the SES-5 is to amass experimental materials, to develop designs for units and assemblies, after all everything is new as regards construction and operation of such a power station. It needs to be pointed out that when designing the solar electric power station there were other participants besides our institute and its Belorussian branch. There were specialists from the All-Union Thermotechnical Institute imeni F.E.

Dzerzhinskiy, Glavenergostroymekhanizatsiya /Main Administration for the Mechanization of Power Station Construction/. The Riga department of the institute of Atomteploelektroproyekt /Institute for the Designing of Atomic and Thermal Electric Power Stations/ was tasked with developing a design.

Now the construction work is entering the crucial phase. The first part of the power station is to be completed next year. It is true that only 400 heliostats will be operation at the start, but as the construction work comes to an end the remaining assemblies will be put into operation.

The operation of the first SES-5 must provide an answer to one of the main questions presently of interest to power industry workers: how will the solar power station compete with thermal electric power stations? It is clear that it is necessary to consider both the ecological and economic aspects, including reducing the cost of a kilowatt-hour.

Scientists and engineers are already working on designs of solar power stations with rated capacities of 200,000 to 300,000 kilowatts.

The scientist continues, "of course the scale of constructing big solar power stations will be enormous, For such a power station it will be necessary to build several towers. Their height will be about one quarter of a kilometer and the area of the mirror surfaces will be something on the order of 2.5 square kilometers. However, the energy of the sun reaching the earth's surface is enormous. According to estimates, for example, in Central Asia, where construction is planned in the future, in one year it is possible to obtain electric power in an amount equal to that generated by all electric power stations in the USSR today."

8927
CSO: 1822/355

SAYANO-SHUSHENSKAYA GES CONSTRUCTION REPORT

Leningrad LENINGRADSKAYA PRAVDA in Russian 9 Aug 83 p 2

/Article by B. Malyshev: "Meetings at the Karlov Channel: Rapid Development for the Energy Complex"/

/Text/ The Sayano-Shushenskaya GES in correctly called a giant of Soviet hydroelectric power industry. Today one can confidently say that the decision of the 26th Party Congress to complete the construction of the Sayano-Shushenskaya GES in the current five-year plan will be fulfilled. This has become possible due to the clear interaction of all participating collectives engaged in the construction of the electric power station. The starting point for this close cooperation was set eight years ago by the "contract of the 28", which was approved by the CPSU Central Committee.

"...to provide a well organized and uninterrupted work of the entire economic mechanism," was emphasized by Yu. V. Andropov in his speech at the June Plenum of the CPSU Central Committee, "this is the requirement of the day and a program task for the future." It is no accident that the experience of the Leningrad enterprises and organizations, which are participating in the construction of the Sayano-Shushenskaya GES, in developing socialist competition to reduce the amount of time and to come up with a high quality of work came to be used in many sectors of industry. And in Sayany the creative cooperation of the Siberians and Leningrad workers has long ago gone beyond the framework of building a hydroelectric power station. At present this cooperation is helping to solve complicated problems connected with establishing and expanding the Sayansk territorial-production complex - the largest in Siberia.

On the southern edge of the Minusinskaya Basin where the Yenisey River, having gone on a rampage, slips out of the rocky embrace of the mountains into the flowering steppe, the city of Sayanogorsk has spread out. Sayanogorsk is the home of the builders of the world's largest hydroelectric power station and a major aluminum plant. From here to the Sayano-Shushenskaya GES - the source of energy for the enormous territorial-production complex - it is 40 kilometers to the deep canyon that has been cut in the rocky cliffs by the powerful Siberian river.

The cliffs could withstand the pressure of the Yenisey, but man subdued it with a dam weighing 25 million tons, which disrupted the rapid speed of the river, forcing it to do its task, Nearly five years ago - 18 December 1978 - the first power unit produced industrial current; now there are six units in operation. The Sayano-Shushenskaya GES will reach its full capacity in the next five-year plan, when the reservoir behind the 245-meter dam will hold more than 30 billion cubic meters of water.

The key task - during the continuing construction of the GES - is to increase the generation of electricity for the enterprises of the territorial-production complex that are now in existence and those now under construction. Since the first power unit was put into operation the GES has already generated 23 billion kilowatt-hours of electricity. This equals the amount of power that the station will produce in one year following the installation of all ten power units. The Leningrad workers, direct participants in the construction of the Sayano-Shushenskaya GES, share with the Siberian workers a record among power station builders and the joy of the labor victory. The well-organized work of the collectives of the Leningrad department of the Gidroproyekt /All-Union Planning, Surveying and Scientific-Research Institute imeni S.Ya. Zhuk/, the associations Elektrosila and Leningrad Metallurgical Plant, the trusts Spetsgidroenergomontazh /Special Hydroelectric Power Station Installation Trust/, Gidroelektromontazh /Hydroelectric Power Station Installation Trust/and many other enterprises and organizations in Leningrad are largely responsible for setting the pace of the work.

The pace of the construction is very taut. Before the end of the five-year plan they must complete the remaining four power units at the Sayano-Shushenskaya GES and another three units at the Maynskaya GES, which is some 25 kilometers below on the Yenisey River - this is the pledge made by the Siberian hydroelectric power station builders. Seven "start-ups" within two years - never before has such a pace been set.

Vyacheslav Sergeyevich Demidenko, a candidate member of the CPSU Central Committee and crew chief of installers from the Spetsgidroenergomontazh Trust, is convinced that they will complete nine start-ups rather than seven. Today the dam is at the Karlov Channel and is holding a column of water almost 130 meters thick. But

the level of the Sayanskoye reservoir continues to rise: soon it will hold ten billion cubic meters of water. Soon it will be time to remove the spare wheels of the turbines of power units number one and two, which are rated for a small amount of pressure, and install the regular wheels. This is an undertaking no less complicated than installing the new hydrounits.

When one approaches the Sayano-Shushenskaya GES one feels how elastic the concrete trembles beneath your feet - this is the Yenisey River pounding against the blades of the six super-powerful turbines.

Above the floor of the immense machine room one can see only the small cylinder domes, barely the height of a man. Only after having proceeded through the room about 200 meters toward the power units, which are still being installed, does one understand what is concealed beneath the floor. Several tens of meters below into the deep trench are the circular shafts in the interweavings of the pipes and fittings. Somewhere far below on the bottom of these enormous wells the lights of the electrowelding can be seen as little sparks.

"Are you impressed?", asks Vladimir Petrovich Zhiltsov, the chief of the brigade of installers. "Another 'filler' must be here - a turbine and generator. One generator weighs almost 2,000 tons. Can you imagine such a bulky object?"

Zhiltsov's brigade is now finishing the installation of the turbine and the guide device for power unit number seven. Installers of the highest skill levels are working in the brigade. Let us take a closer look at just Ivan Maksimovich Taymentsov. He installed units at the Bratskaya, Krasnoyarskaya, Ust-Ilimskaya and other GES's and knows every aspect of his job. Ivan Maksimovich and his comrades, N.N. Belousov, G.Ya. Musokhranov and A.F. Sazonov are the most respected people at the construction site. Everyone remembers what these men did in the spring of last year.

In March they had to shut down power unit number five for current maintenance. The task would take at least six months. According to all estimates this meant that the power station would be without one generator by the time that the spring flooding arrived. Millions of cubic meters of water would have to be allowed to run through the spillway on a no-load basis.

To prevent this Zhiltsov's brigade suggested not removing the unit from the shaft, but rather just lifting it up a bit and suspending it on the blades of the guide device. Thus without dismantling the turbine assemblies, the installers repaired its lower section. They accomplished this feat in less than two months - a record setting short period of time.

It is no accident that out of six brigades from the Spetsgidroenergomontazh Trust, which are working on the Sayano-Shushenskaya GES, the best is that headed by V.P. Zhiltsov. For 12 of his 36 years Vladimir Petrovich has been a builder of hydroelectric power stations. Not so long ago he was in charge of an element in the famous brigade headed by V.S. Demidenko. Today Zhiltsov's brigade is leading his teacher's in the competition. Demidenko's collective is working along side that of Zhiltsov on the installation of of the fittings, pipelines and fastening devices for power units number nine and ten.

The chief of the Krasnoyarsk Installation Administration of the Gidroelektromontazh Trust, Nikolay Mikhaylovich Tolkachev, will peek into the machine room to see how things are going with the turbine installers. The nearer the start-up date for power unit number seven the more work that the electricians have to do. For they are responsible for connecting the next generator to the unified power grid for Siberia.

The Gidroelektromontazh collective is not limited to working on the GES. The brigades of electricians can be encountered throughout the area of the Sayanskiy territorial-production complex: at the Abakanskaya and Minusinskaya thermal electric power stations that are now under construction; at the livestock complexes in the Khakass Autonomous Oblast; and in remote Tuva; and two kilometers from the Sayano-Shushenskaya GES - in Cheremushki, a settlement for the hydroelectric power station builders, where the electricians are working...and in a school. After all the school must be readied for the next school year.

In Cheremushki one forgets that thousands of kilometers separate this village from Leningrad. One gets the impression that only Leningrad residents are living here. The engineers are from the Elektrosila plant, the Leningrad Metallurgical Plant and the Elektroapparat Plant. The workers are from the Spetsgidroenergomontazh and Gidroelektromontazh trusts. And there are representatives from the scientific and design institutes. This is a true Leningrad land holding in Siberia.

These people are rarely at home. This is the case for an engineer from Elektrosila, Viktor Grigoryevich Isayev, whose children were were born and raised here. The family of Valeriy Leonidovich Vasyukov, a foreman and graduate of the Leningrad Polytechnical Institute, has lived here for five years. The Leningrad hydroelectric power station builders have gotten use to Siberia and more than likely many of them will not be returning home any time soon. After all after November 1987, when by the celebration of the October Revolution 70th anniversary all work on the Sayano-Shushenskaya GES will be completed, the KrasnoyarskGESstroy /Krasnoyarsk GES Construction Trust/ will start work on new power stations in the Yenisey River cascade. So the cooperation of the Siberians and Leningrad-people will not stop for even a minute.

Karill Konstantinovich Kuzmin, the chief engineer from the KrasnoyarskGESstroy Trust, has highly praised the work of his partners from the shores of the Neva River.

He reports, "I cannot recall one instance when we as the general contractors have been let down by the Leningrad suppliers or subcontracting organizations, who are doing almost one sixth of all the work on the construction of the GES."

The reputation of the reliable partner is being won with a great deal of difficulty. Thus, while the first power unit of the Sayano-Shushenskaya GES was put into operation only after the rotor of the generator was dropped into position, another month passed before the unit was put on load; by the time the installers were working on power unit number six the work was performed almost one and a half times faster.

Such has been the case with everything that the Leningrad workers do: from year to year they fulfill their tasks faster and better. The working wheel for the ninth power unit is now enroute to the Yenisey River via the Northern Sea Route. The Leningrad machine builders must ship a wheel to Sayany this year for the final and ninth power unit. Now the question of when the next generators of the GES will provide current depends only upon those who are working in Sayany.

The energy heart of the Sayanskiy territorial production complex is growing and getting stronger. And the people who have given themselves to this project are also growing. Communist Gleb Fedorovich Ognev, a common installer, of which there are many here, in August 1982 made a trip to the Kolymskaya GES, where he headed a brigade of stator installers. On the 15th day following the installation of the rotor the second power unit at the Kolymskaya GES was put into operation. For now that is the quickest that a power unit has been put into operation - and the feat was accomplished by men from the Sayano-Shushenskaya GES.

In the evening we accompanied Anatoliy Illarionovich Yaroslavskiy, the acting chief of the Bratsk Administration of the Spetsgidroenergomontazh Trust on a trip to the other side of the Yenisey River to an inspection site, from which one can in a single glance take in the entire construction project. In the canyon directly below us on the exterior side of the gigantic arc in the channels of the spillway rushed the rapid current - from a height of 120 meters the Yenisey River falls down into an apron well and the water is changed into white foam.

Yaroslavskiy exclaimed, "Here it is - the energy. It must pass through the power units."

He stood above the high precipice and pondered his own affairs. Perhaps he was thinking about the fact that in only two years the Yenisey River, having been harnessed by all nine of the power units of the Sayano-Shushenskaya GES, will be again dammed for the Maynskaya GES, which will be located some 25 kilometers further down the river. And only after having yielded its energy will it flow into the Krasnoyarskoye reservoir.

The Mayna River. These words are being heard more and more often in Sayany. The hydroelectric power station builders must build this small hydroelectric power station (small on a Siberian scale and representing half the rated capacity of the DenproGES) before the giant at the Karlov channel reaches its full capacity. The Maynskaya GES, which until recently was overshadowed by the enormous dam of the Sayano-Shushenskaya GES, has become an object of key importance for the Siberian and Lenigrad hydroelectric power station builders.

And I was not surprised when Anatoliy Illarionovich said, "Have you seen enough? Now we have to go take a look at the Mayna."

8927
CSO: 1822/355

MAYNSKAYA GES CONSTRUCTION REPORT

Leningrad LENINGRADSKAYA PRAVDA in Russian 10 Aug 83 p 2

/Article by B. Malyshev: "Rapid Development for the Energy Complex: In the Hands of the Mountains"/

/Text/ The Maynskaya GES is being built to ensure that the water level of the Yenisey River remains constant regardless of the mode of operation of the Sayano-Shushenskaya GES. That is why the Maynskaya GES is called a counter-regulating hydroelectric power station. After visiting the grandiose dam at the Karlov channel the construction site at the Mayn settlement seems small.

One can fully appreciate the size of the construction work on the Mayn River only by going down from the steep shore of the Yenisey, along which passes the Sayanogorsk-Cheremushki highway, to the trench that is set apart from the river by earthen bulkheads. It reminds one of an open coal quarry - on the bare bottom of the river. A quadrangular "bath" has been blasted to a depth of 25 - 30 meters in the black shale. It has then been squeezed on two sides by high concrete walls. The GES building will stand here with its three power units, each of which will be able to generate 107,000 kilowatts.

Only the central portion of the power station, where the spillway and power units are to be placed, will be concrete. Everything else will be a filled dam of gravel and loam, which will raise the water level of the Yenisey by 19 meters and connect Sayanogorsk with the Shushenskiy Rayon. When this done one can travel via an excellent asphalt highway to Shushenskiy to the dam at the Karlov channel in just an hour.

If the Sayano-Shushenskaya GES can be called a key project, then the Maynskaya can certainly be called the advanced post of the Sayano-Shushenskaya. The best hydroelectric power station builders from the KrasnoyarskGESstroy, the best of the best, have come together here. It is sufficient to say that the brigade of concrete workers headed by Hero of Socialist Labor Valeriy Aleksandrovich Poznyakov, the first to receive this high rank in the building

of the Sayano-Shushenskaya GES, is working on the Mayn River project. Next to this collective works another, no less famous collective, which is led by Leninist Komsomol prize winner and holder of the Order of Lenin, Sergey Yegorovich Kolenkov.

The first cubic meter of concrete was poured on the botton of the river on 22 April 1980. Since then some 150,000 cubic meters, representing more than one half of the concrete work, have been poured. In commemoration of the 80th anniversary of the 2nd Party Congress the hydroelectric power station builders pledged to speed up the pace of their work so that the Yenisey River would be spanned by 22 April 1984 and the first power unit would be put into operation at the new power station in December of 1984.

According to the approved design it was proposed to place the dam on a "dry" bottom, which means that the bulkheads would be poured and all work would be done in the trench. But specialists from KrasnoyarskGESstroy and Lengidroproyekt made a substantial adjustment to this concept during the course of the construction work. They decided to proceed without erecting bulkheads on the right-hand shore. This means that 22 April 1984 will not only be the day that the Yenisey River is spanned for the third time at the Mayn River but also the first day for the new dam. The dam will come into being immediately after the river is spanned; it will increase in size and density at the same time that the water level in the Maynskoye reservoir rises. This bold decision will make it possible to reduce the amount of time required to construct the GES by a year to eighteen months. Thus, the cooperation of the Siberian construction workers and Leningrad designers has made it possible to significantly speed up the construction of the GES on the Mayn River, which will without doubt save a lot of money.

The "little shoulder" of cooperation, which is what the labor collectives working on the Sayano-Shushenskaya GES call the business dealings among themselves, is producing similar savings. Brigades from the Gidromontazh Trust are working on the Sayano-Shushenskaya GES on a tight schedule. They have a lot to do. The most complicated task of all is now getting underway - on the dam they are installing the upper portion of the spillway and water intake. Each man has a responsible task. The concrete workers on the Mayn River project are pressed to get their work done - the hydraulic seals must be installed.

A complicated situation has evolved. Then the brigades from the Spetsgidroenergomontazh took on the task of doing the installation work on the Mayn. Now they are not only installing the turbogenerator units, but all of the groove structures, the seals for the water intakes of the draft tubes and the spillway as well.

K.K. Kuzmin, the chief engineer from KrasnoyarskGESstroy states, "For us, the general contractors, it is advantageous to have all of the installation work centralized in one organization."

Having taken on the additional pledges, the Leningrad installers got together with the concrete workers from KrasnoyarskGESstroy and came up with a plan of joint efforts. They proposed assembling a powerful KBGS-1000 lifting crane on the left-hand shore of the river. This is the crane used for pouring concrete at the Sayano-Shushenskaya GES. They decided to assemble it without waiting until a spot was prepared for it on the dam.

A.I. Yaroslavskiy explained the nature of this proposal in this manner: "The '1000' will build the road for itself from the shore to the GES building. It will pour concrete in front of itself and we will need only to raise the tracks on the finished scaffolding."

'By that time, when the installers begin installing the large assemblies of the hydrotechnical facilities and assemblies, the "1000" will be there to assist us. The installers and the concrete workers stand to gain from this."

And now everything depends upon the brigade of Vladimir Grigoryevich Dudchenko, which is assembling the crane. In August - nearly one month ahead of schedule - the crane will be placed in an upright position. It was manufactured with the participation of the Lenpodyemtransmash /Leningrad Production Association of Lifting and Transport Machine Building/ Association - such was the pledge made by this collective.

At the installation site nearby is the brigade of Anatoliy Aleksandrovich Seleznev, which is assembling the multi-ton fastening parts for the stator of the first turbine, which bears the trademark of the Leningrad Metallurgical Plant Association. This brigade has decided to finish work on the stator by the end of the year.

Sergey Vladimirovich Overchenko, a graduate of the Leningrad Polytechnical Institute, is in charge of all installation work on the Mayn River. He is not yet 30 years old and already he has had experience on the Sayano-Shushenskaya GES and has installed units at the Ust-Ilimskaya and Kolymskaya GESes. His wife also graduated from the Leningrad Polytechnical Institute and is now working in Sayany.

On the Yenisey River the effect of the creative cooperation, which was given impetus by the "contract of the 28", is quite evident. And this effect is manifest not only in reducing the amount of time to do the task and improving the quality of the work. The cooperation determines the fates of people. Overchenko himself while a student participated in the research for the development

of the hydrounits for the Sayano-Shushenskaya GES. After receiving his diploma, he came here to oversee their assembly.

In Cheremushki, Sayanogorsk and Mayn one encounters young boys and girls in their green uniforms bearing the emblem "Polytech". Each year hundreds of students from the Polytechnical Institute spend their third work semester here. This year in Sayany some 500 young boys and girls from the Leningrad Polytechnical Institute are working. And more than likely among them there are those who in the near future will be required to install new power giants on the Yenisey River and its tributaries.

It is not just hydroelectric power stations that they will be constructing. Could brigade leader V.S. Demidenko have ever dreamed that his star installers would one day be required to be reclassified as land reclamation workers? But that is exactly what has happened. The Siberians appealed to the Leningraders for help in modernizing the Uyskaya irrigation system and building the Oznachenskaya irrigation system, which are earmarked to bring irrigation to the Koybalskaya Steppe. It was necessary to extend the pipelines from Mayn through the mountains and into the steppe. And the hydroelectric power station builders took on the job.

Demidenko's brigade, or to be more precise an element of his brigade that is headed by Aleksandr Ivanovich Malyuzhanets , was the first to reach Mayn. Malyuzhanets, who is quiet and thoughtful and accustomed to taking on any task only after having given it careful consideration, followed his policy in this strange situation. Before laying the first pipe, he assembled his element and conferred with his comrades.

The conclusions reached by the hydroelectric power station builders were unexpected for land reclamation workers. First, the Leningrad workers recommended changing the proposed route for the pipeline. Second, they decided to reject the traditional methods of laying pipe.

Usually, in mountainous conditions pipes are welded in short lengths and raised to the positions that have been prepared on the slope. And here the lengths are joined together. After all a lifting crane cannot be used on the slope of a mountain and without it the pipes cannot be connected. Malyuzhanets' element took an easier path. Having "saddled" the next mountain, the installers dragged the pipes to it and welded them into lengths and then using a winch and an installation trolley they lowered the finished sections down the slope to the section of the pipeline that had already been prepared. To tear the pipes from the earth and lift them to the joint, they used "air pillows", large rubber chambers, rather than a crane.

As if to see a miracle people came to admire the work of the Leningrad workers. They were accustomed to seeing the side of a mountain totally destroyed when a pipeline is installed on a steep slope of a mountain. And here they beheld a strand of pipeline going from one mountain to another without disturbing a single tree.

Demidenko's brigade continues to work in two elements - one in the mountains and the other at the Sayano-Shushenskaya GES. Within a short period of time, both elements will be joined together to work at Mayn, where they will help with the start-up of the final hydrounits for the power source of the Sayanskiy territorial-production complex. And then there will be new power stations and new labor victories.

But in Sayany they will long remember those who brought new life to this distant kray. The mighty electric power stations with their powerful hydrounits and the manmade reservoirs in the hands of the mountains, the power transmission lines and pipelines which bring life and flowering gardens to the dry steppes will remain.

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BRIEFS

EKIBASTUZ-BARNAUL LEP--A LEP-1150, a 1,150 volt system, has reached the Pavlovskiy Rayon of the Altay Kray. The LEP starts in the Kazakh SSR. The energy bridge will connect Ekibastuz with Barnaul. /Text/ /Moscow SOVETSKAYA ROSSIYA in Russian 12 Jun 83 p 1/ 8927

ROGUNSKAYA GES REPORT--The builders of the Rogunskaya GES in the Tajik SSR have fulfilled their assignment ahead of schedule. A prefabricated shop for the cutting and welding of pipes with a diameter greater than five meters has been shipped to the power station from the Irtysh Gidrostalkonstruktsiya /Hydroelectric power station steel structures/ Plant. The shop was placed on a single railroad flatcar. The installers will be able to quickly set up such a shop even in the mountains - the prefabricated metal housing unfolds like an accordion. This relieves the hydroelectric power station builders from having to dig the trench and delivering the construction materials and other work needed when erecting stationary structures. The compact structure is especially convenient for transporting via narrow roads in the canyons. And the thermal insulation of the exterior cover does a good job of protecting the workers from heat. /Text/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Jun 83 p 1/ 8927

BRATSKAYA GES MODERNIZATION--An important stage in the modernization of the Bratskaya GES has been completed. Today the final, number 18 hydrounit was again put into operation. This coincided with the generation by the power station of 400 billion kilowatt-hours of electricity. Hydroelectric technology has never seen the equal of a single power station generating so much electricity anywhere in the world. We recall that the first unit of the power station was put into operation over 20 years ago. Throughout this period of time the operators and the scientists and machine builders have sought to improve the power station. The rated capacity of the station was increased by nearly 500,000 kilowatts through modernization. The modernization of the GES will continue. Together with the Ust-Ilimskaya GES the Bratskaya GES is the heart of the major territorial-production complex, which has come into being on the Angara River. The energy from these power stations operates enterprises of the non-ferrous metallurgy and celluose and paper industries; the LEPs deliver electricity to the cities and settlements of the Baykal-Amur Railroad. /Text/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 May 83 p 1] 8927

TOBOLSKAYA TETS REPORT--The tight schedule of the pre-adjustment work on the first power unit of the Tobolskaya TETs has not died down. The TETs was put into operation in April; already the construction workers are working on the second power unit with a rated capacity of 175,000 kilowatts. The brigades led by N. Masakovskiy and A. Belyayev from the TETs construction administration are now pouring concrete for the foundations beneath the turbine and boiler assembly. The installers who work for honored builder of the RSFSR, S. Krylov and V. Panteleyev from the Uralenergomontazh Trust are now assembling the steam boiler and other equipment. Within a four month period the builders completed work valued at 600,000 rubles more than had been planned. This confirms their resolve to put the second power unit into operation this year. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 23, Jun 83 p 15/ 8927

NUREKSKAYA GES REPORT--The construction of the final of the key facilities for the Nurekskaya GES has been completed. This is the so-called catastrophic spillway. This almost 350 meter tunnel, which is intended to release excess water during particularly heavy flooding of the turbulent Vakhsh River. Although such floods, according to estimates of specialists, happen only once in a hundred years, the GES which was built in the mountains with a rated capacity of 2.7 million kilowatts must be insured against all dangerous catastrophes. The spillway was built in difficult geological conditions: it was ruptured at an inclination of 30 degrees. /Text/ /Moscow IZVESTIYA in Russian 29 Jun 83 p 2/ 8927

BUREYSKAYA GES REPORT--The builders have commenced their assault on the tayga massif, which approaches Talakan, the settlement for the builders of the Bureyskaya GES. Powerful bulldozers are laying the sidings, clearing the sites and marking the boundaries for the first facilities. It is necessary to raise a city, in which the builders and operators of the power station will live. Having come to the Amur tayga from various regions of the Soviet Union, the Komsomol envoys have already completed a great deal of work. Production bases and repair shops have been established; and a temporary settlement has been built. In addition, a high-voltage LEP has been built from the Zeyskaya GES. While working on the main facilities the builders are starting to set up the city. The city will be made up of seven microregions consisting of multi-storey apartment buildings, a common city center with a club, movie theater, hotel and other facilities. Amid the white stone buildings they will preserve some small patches of the original tayga. /Text/ Moscow SEL'SKAYA ZHIZN' in Russian 2 Jul 83 p 1/ 8927

GRES FOR SAMOTLOR OIL FIELD--In Nizhnevartovsk, near the famous Samotlor oil deposit, work has gotten underway on a powerful GRES. The need to build this important facility is evident: after all more and more energy is needed here. The development of the region continues at a rapid pace. In the next five-year plan the new power station in the Central Ob River region will generate its first current. /Text/ /Moscow IZVESTIYA in Russian 26 Jun 83 p 1/ 8927

YEREVANSKAYA TETS REPORT--An original design done by the specialists from the Armenian Scientific-Research Institute of Power Engineering of the USSR Ministry of Power and Electrification has made it possible to significantly reduce the expenditure of natural gas that is used by the Yerevanskaya TETs. The burner devices for the boilers and the new technological layout that was adopted will make it possible to use exhaust gases from the chemical enterprises located nearby as a fuel. These devices were installed based on recommendations made by the specialists. /Text/ /Moscow IZVESTIYA in Russian 15 Jun 83 p 3/ 8927

KATUN RIVER TO PRODUCE ENERGY--In the 11th Five-Year Plan in the Mountainous Altay Kray work will get underway on an hydroelectric power station that will be the largest in Western Siberia. All glaciers in Altay Kray feed into Katun River. V.V. Sapozhnikov, a renowned professor and researcher on this river basin from Tomsk University, has noted that the Katun River possesses a great deal of energy and in capacity takes a back seat only to the Yenisey River. Recently the first detachment of hydroelectric power station builders, who will also build the future city of Katunsk, arrived in the mountainous kray. The settlement of Mayma greeted the column of large trucks and prime movers with equipment. The builders who came here were tested veterans from the Soviet Union's largest construction project - the Sayano-Shushenskaya GES. Among the pioneers for the new GES are Vasiliy Nikolayevich Zakharov and Igor Afanasyevich Zaytsev, KrasnoyarskGESstroy veterans, who came to Siberia twenty years ago on a Komsomol travel pass to work on the Sayano-Shushenskaya GES. Now there is Katun. /Text/ /Moscow KOMSOMOL'SKAYA PRAVDA in Russian 28 Jul 83 p 2/ 8927

ANGRENSKAYA GRES-2 REPORT--A red flag, raised to the 330-meter height above the valley of the Angren River, marks the labor victory of the construction workers. At the Angrenskaya GRES-2 the pouring of concrete in the casing for the smoke stack of this thermal electric power station was completed ahead of schedule. The GRES 2, which will burn coal from the Angrenskiy deposit, is being built at a fast pace. The first of its eight power units with a rated capacity of 300,000 kilowatts is to be put into operation next year. The report was issued from Nurabad in Tashkent Oblast. /Text/ /Kishinev SOVETSKAYA MOLDAVIYA in Russian 25 Jun 83 p 1/ 8927

NERYUNGRINSKAYA GRES REPORT--The brigades of P. Statsenko, Yu. Sukhodolskiy and N. Savateyev from the Vostokenergomontazh Trust have completed the installation of the boiler and turbine for power unit No 1 at the Neryungrinskaya GRES, with a rated capacity of 210 megawatts, a full month ahead of schedule. The GRES will be put into operation at the end of this year and will generate current for the Southern Yakutsk Territorial Production Complex, the first such complex in the area served by the Baykal-Amur Railroad. The success of these progressive installers was made possible by the friendly efforts and high degree of good organization of the collectives and their constant concern for strengthening labor discipline and increasing labor productivity. The report is filed from the settlement of Serebryanyy Bor in Yakutsk Oblast. /Text/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Aug 83 p 1/ 8927

LEP FROM STAVROPOLSKAYA GRES--Construction workers are installing a power transmission line between Inguriges and the Stavropolskaya GRES through the Nakharskiy Pass in the mountains of the Greater Caucasus. Here, at a height of 3,000 meters, they have completed the installation of the final, one hundredth mast without a concrete foundation. Earlier they chiseled a trench in the cliff for the reinforced concrete foundation, which supports the mast. On the recommendation of Moscow scientists the cliff will serve as the foundation. They are cutting anchor bolts into the cliff and reinforcing the cliff with a cement solution - and the mast has been safely secured. A significant savings in resources is realized. A LEP-500 will connect the power systems of the Caucasus and the Northern Caucasus. The power bridge is being built from both ends. /Text/ /Moscow IZVESTIYA in Russian 4 Jul 83 p 3/ 8927

EKIBASTUZSKAYA GRES-1 REPORT--At the end of April the sixth power unit, with a rated capacity of 500,000 kilowatts, at the Ekibastuzskaya GRES-1 began generating current. The total rated capacity of this first station in the Ekibastuz energy complex has reached three million kilowatts; the power station has become the largest in the Kazakh SSR. The completion of power unit No 7, also a 500,000 kilowatt unit, is coming up. Work is proceeding at full pace on the installation of the boiler and turbine. The power station operators are doing a good job this year. More than four billion kilowatt-hours of electricity have been generated, which is in excess of the assignment. The implementation of measures for raising the reliability of the equipment and reinforcing labor discipline and production discipline have led to this success. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 20, May 83 p 16/ 8927

EKIBASTUZ COAL REPORT--Miners from the Ekibastuzugol /Ekibastuz Coal Production Association/ have extracted the 800 millionth ton of coal since the coal deposit was first mined. More than 100 excavator and locomotive brigades competed for the privilege of shipping this ton of fuel. The brigade led by N. Krivosheyenko, which works at the Bogatyr open pit mine and services the ERP-2500 rotor complex, achieved good results. The brigade's account shows more than 250,000 tons of coal in excess of the plan. The brigades of excavator operators, which are led by Hero of Socialist Labor A. Vitt and S. Zubko, made a major contribution to this labor victory. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 20, May 83 p 16/ 8927

EKIBASTUZ INFRASTRUCTURE REPORT--For the energy complex builders of Ekibastuz the key social and cultural facility is a school that will be able to handle 1,500 students. The brigade led by V. Sizintsev, the best in the Ekibastuzenergostroy Trust, is building the school. A smooth schedule of work has been developed. Problems having to do with deliveries of materials from various cities have been solved. Only the Yermakovskiy Reinforced Concrete Articles Plant, which is located nearby, is not holding up its end of the bargain. The Yermakovskiy plant is delaying the delivery of columns, spanning plates and have shortshipped nearly 70 ventilation units. The plant managers still have not answered whether or not they will produce the 120 necessary elements for the installers which are to be done according to individualized blueprints or if the order should be given to other enterprises. How soon the children of the energy complex builders and power workers can start school depends upon the solution of these problems. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 20, May 83 p 16/ 8927

EKIBASTUZ RESPONSE TO ABOVE--The general director of the Ekibastuzenergo Production Association, G. Barkov, responds to a report in Issue No 12 of this newspaper. As regards the construction of social and cultural facilities in Ekibastuz I offer the following. The kindergarten that was mentioned in the article has now been completed in the first quarter. One more kindergarten, a dining hall and a commercial center are to be completed in the fourth quarter. At present the work on these facilities is proceeding on schedule. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 20, May 83 p 16/ 8927

DNESTROVSKAYA GES REPORT--V. Fionov's brigade has done an excellent job of completing an important task in the construction of the Dnestrovskaya GES. The workers installed the rotor of the electric generator considerably faster than called for by the schedule. The fifth generator is being assembled at the same time as the sixth. The installers have succeeded in placing the maximum number of lifting mechanisms in a limited space; and in so doing they used the high-speed assembly method to the fullest extent. V. Troitskiy, whose brigade was tasked with the final adjustment of the assembly, says, "the reciprocal earnings concept, a high degree of labor discipline and well coordinated actions of the related participants will help. We, for example, are satisfied with the pace and quality of the labor of V. Fionov and his comrades." And the installers, in turn, have opened up the work front for the concrete workers from V. Yeremeyev's brigade ahead of schedule. The key complex is near completion: the fifth turbine is to be tested in the middle of September. By the end of the year the sixth and final power unit will be put into operation. When this unit is in operation the GES will attain its planned rated capacity of 700,000 kilowatts. The reservoir of the hydrounit on the Dnestr River will irrigate 500,000 hectares of land in southern Ukraine and in Moldavia. The water supply for many populated areas will be improved. /Text/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Aug 83 p 1/ 8927

ALI-BAYRAMLINSKAYA GRES REPORT--The power industry workers at the Ali-Bayramlinskaya GRES imeni Ilich have generated some 17 million kilowatt-hours of electricity for the national economy; they have overfulfilled their socialist pledges that they made for the third year of the five-year plan well in excess of the plan. In the progressive collective effective organizational-technical measures have been successfully implemented, which has made it possible to ensure the operation of all power units at the power station in an optimal mode and to conserve nearly 1,000 tons of standard fuel. They have also managed to attain the frontier for generating the fifth billion kilowatt-hours of electricity well ahead of schedule. Among the power workers a socialist competition has gotten underway to come up with a worthy accomplishment for the 25th anniversary of the movement for Communist labor. The electrical shop and the hydroshop as well as the brigades of A. Nagiyev, A. Guseynov and M. Aliyev have achieved the best indicators. With their outstanding labor they justify their honorary title of the collectives of Communist labor. For the celebration of this movement the progressive workers have taken on increased pledges. /Text/ /Baku VYSHKA in Russian 11 Aug 83 p 1/ 8927

EQUIPMENT FOR SAYANO-SHUSHENSKAYA GES--The 146-ton operating wheel for power unit number nine at the Sayano-Shushenskaya GES has been delivered to the Karlov channel. The Sovetskaya Yakutiya ship received the valuable cargo in Leningrad. It passed through five seas and overcame the icy path of the Northern Sea Route and arrived at the polar city of Dudinka. Here the seamen handed their baton to the river fleet sailors. Along with the working wheel they delivered a rotor for the auxiliary generator for the ninth power unit and a bath for the lift of the first hydroturbine of the Maynskaya GES. /Text/ /Moscow VODNYY TRANSPORT in Russian 3 Aug 83 p 1/ 8927

CHEBOKSARSKAYA GES REPORT--The final hydroelectric power station in the Volga River cascade, the Cheboksarskaya GES, is to receive a generator which will arrive today at the Elektrosila Production Association. The generator with a rated capacity of 78,000 kilowatts with the station number of "11" was manufactured well ahead of the planned schedule, as stipulated by a contract between the Leningrad manufacturers and the builders of the GES. Reserves for speeding up the work were found in the hydrogenerator shop of Elektrosila during the course of the competition to come up with a worthwhile feat for the 25th anniversary of the Communist labor movement. Among the leaders of this labor competition were the brigades of insulators led by Z. Timofeyeva and drill operators led by A. Yegorov. While accomplishing their taut socialist pledges, which were aimed at fulfilling the assignment for the first three years of the five-year plan ahead of schedule, these labor collectives made full use of the advantages of the brigade form of organizing labor. They work against a single order, which prevents tasks from being broken down into those that are "profitable" and "not profitable" and which promotes the rapid dissemination of progressive experience - all members of the collective are motivated to achieve the highest common final result. Some 18 assemblies will be installed at the Cheboksarskaya GES. The Elektrosila collective is now working on the final generators in the series. When it reaches designed rated capacity the power station will begin producing some 3.5 million kilowatt-hours of electricity every day. /Text/ /Leningrad LENINGRADSKAYA PRAVDA in Russian 24 Jun 83 p 1/ 8927

FRUNZENSKAYA TETS MODERNIZED--Without additional outlays of fuel the new buildings in the two microrayons of Frunze are now being supplied with hot water by the power workers at the capital TETs. This is the result of modernization, after which the condensation turbines, which before generated only electricity, took on the job of producing "thermal" energy and began to operate in a thermal heating mode. Without the installation of the new power equipment the thermal capacity of the TETs increased one and a half fold. The city is growing and is being built. And while the problem of the ever growing comsumption of electricity in conditions of the Kirghiz SSR can be solved by the successful construction of a cascade of hydroelectric power stations on the Naryn River, the problem

of how to further provide the city with heat remains unsolved. At the same time that the question about building a second thermal electric power central for the needs of the republic capital is being studied, specialists have put into operation one of the reserves for making more rational use of available capacities. /Text/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Jul 83 p 1/ 8927

ROGUNSKAYA GES EQUIPMENT--Ust-Kamenogorsk. The assembly and disassembly shops will significantly reduce the amount of time required for installing the gigantic water conduits when building hydroelectric power stations. Their production has been assimilated at the Irtysh Gidrostalkonstruktsiya Plant of the USSR Ministry of Power and Electrification. Having dispatched from the sidings a special railroad flatcar, upon which is placed an entire piece of equipment for cutting and welding pipes with a diameter greater than five meters, the plant collective filled the order of the builders of the Rogunskaya GES in Tajik SSR ahead of schedule. The installers will be able with minimum outlays of labor and time to erect such an equipment set even in the most difficult mountainous conditions - the assembly and disassembly mechanized casing unfolds like an accordion. This relieves the hydroelectric power station builders from efforts connected with digging a trench and delivering construction materials and other work which were necessary previously for erecting similar stationary shops. The compact structure is particularly convenient when being transported along narrow roads in the canyons. The external covering of the equipment set provides reliable protection from heat and cold. To speed up the assembly of this shop the plant workers were helped by shifting the primary kinds of work to an automatic mode, the importance of which was emphasized at the June (1983) Plenum of the CPSU Central Committee. The innovators have adopted a highly efficient welding stand, which can be run by a single operator. /Text/ /Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 22 Jun 83 p 1/ 8927

SPANDARYANSKAYA GES REPORT--The Ararat Cement and Slate Combine owed the builders of the Spandaryanskaya GES 1,100 tons of cement for the second quarter. The work schedule for this key project of the 11th Five-Year Plan was threatened with disruption. The shortage of cement slows the construction of the power station building, the pouring of concrete for the tunnel and the construction of other facilities. All efforts of the construction administration managers at the head structures of the Tatevskaya GES of Armgidroenergostroy to pledge the allocated funds were unsuccessful. The vehicles , which were sent out almost daily from Sisian to Ararat, a distance of 150 kilometers, were returning empty. Now the cement industry workers are indicating their readiness to fill the orders of the power station builders, but whether they will be able to accomplish this when the end of the quarter is only a few days off and when some 200 round trips are needed to deliver all of the cement remains to be seen! The director of the combine, L. Petrosyan, said, "we are not the only ones to blame. In such an

extreme situation the cement could be shipped by a centralized shipping method, however the Ararat motor transport enterprise is most unwilling to allocate vehicles for long-distance trips." It is thought that observing the departmental interests in this case is inappropriate to say the least. It is necessary to take all steps on an urgent basis to ensure that the construction of this final project in the Vorotanskiy cascade proceed at a normal pace. /Text/ /Yerevan KOMMUNIST in Russian 25 Jun 83 p 2/ 8927

MORE ON SPANDARYANSKAYA GES--The turbine water conduit, the construction of which has been completed at the construction site of the Spandaryanskaya GES, is ready for operation. One of the crucial stages in the construction of the final stage in the Vorotanskiy cascade has been completed. The almost three-kilometer pipeline will start transporting water from the man-made sea, which was created near the power station, to the GES turbines. The path of the pipeline was built in complicated hydrogeological conditions and represented particular difficulty. The majority of the stretch of the water conduit was laid in tunnels. The heterogeneity of the soil made it necessary to constantly change the map of the drilling. But the builders remained on schedule. In this they were assisted by the highly-productive equipment, the brigade method of organizing labor, and the accurate organization of all services and subelements. The Vorotanskiy cascade, where there are now two power stations in operation, is one of the powerful energy centers of the Armenian SSR. It supplies electricity to the mining organizations and agricultural facilities in this rapidly developing and promising region of the republic. The construction workers are nearing the time when the Spandaryanskaya GES will be put into operation. After it is completed by the year 1985, the annual generation of electricity in the Armenian SSR will reach 16 billion kilowatt-hours. /Text/ /Yerevan KOMMUNIST in Russian 15 May 83 p 1/ 8927

CSO: 1822/355

UDC 621.643.002.2/.658.589

GLAVSIBTRUBOPROVODSTROY TO ACCELERATE WORK

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 83 pp 6-7

[Article by S. P. Vel'chev, Glavsibtruboprovodstroy, Tyumen']

[Text] The subdivisions of Glavsibtruboprovodstroy each year put into operation more than 1,000 km of large-diameter gas pipelines and five or six compressor stations, performing commodity production valued at more than 700 million rubles, thereby ensuring the planned volume of production and transport of gases from the deposits of Western Siberia. The successful implementation of the planned work program is being favored by the introduction into pipeline production of scientific and technical advances, progressive experience and modern technology. For example, due to implementation of measures in the plan for new equipment, in 1982 there was a saving of 56 million rubles. In the subdivisions of the administration there has been extensive use of multipost welding outfits, "Sever-1" electric contact welding apparatus is being introduced and the "Styk" apparatus for welding with powder wire is being prepared for operation.

The administration is the pioneer in the speedy construction of main gas pipelines by large mechanized complexes, the assembly line-combined method for the construction of compressor stations. For the first time in the branch the administration has employed new constructions for the attachment of pipelines in inundated sectors with use of a nonfabric synthetic material (NSM) and local ground, pile metal anchors of the AR-401 type with increased supporting capacity. The last two developments alone have made it possible to obtain an annual economic effect of about 7 million rubles, to achieve a considerable saving of cement and metal, and with the use of NSM for building work roads achieve a saving of hundreds of cubic meters of wood. The administration is directly participating in the implementation of a number of scientific and technical programs provided for by the plan of the USSR State Committee on Science and Technology.

In particular, the administration is constructing experimental sectors of pipes of new designs: two-layer, multilayer, quasimonolithic, developed by the Institute of Electric Welding imeni Ye. O. Paton and the VNIImetmash. However, the completion of work under these programs has obviously been dragged out, although positive intermediate results have already been obtained in the testing of two- and multilayer pipes.

Despite the considerable economic effect of the use of new equipment and methods, the rates of their introduction are still inadequate and no one is doing anything about this.

What is the holdup today in the accelerated implementation of the multisided programs and the more complete use of attainments in science, technology and advanced methodology, especially in construction?

It is well known that in order to introduce a new method or machine it is necessary to restructure production, establish new rates for the performance of work, obtain material and technical resources and wage allocations, and this is not taken into account in the plans for the introduction of new technology. As was correctly stated by Comrade Yu. V. Andropov at the November (1982) Plenary Session of the Central Committee CPSU, questions are asked concerning the nonfulfillment of the production plan, but there is not a murmur concerning the introduction of new technology, which is most important.

There is no one at all to ask concerning the tardy delivery of new materials and equipment. Today, in order to obtain, for example, a nonfabric synthetic material it is necessary to know the need for it provided for in the plan, but planners do not include it in the plan because new technology and new materials are involved for which there are no approved norm-setting documents. A vicious circle arises; for builders -- the plan, and for the factory and planner -- nothing.

In addition, the existing system for material stimulation (granting of bonuses) for the introduction of new technology is imperfect, it does not create interest in the use of technical innovations. As correctly noted by Comrade Yu. V. Andropov at the June (1983) Plenary Session of the Central Committee CPSU, "a manager who 'risked' and introduced new technology at an enterprise, used or produced new equipment, often remains the loser, whereas he who shuns innovation loses nothing." The June (1983) Plenary Session of the Central Committee CPSU posed the problem of developing such a system of organizational, economic and moral measures which would interest managers and workers, scientists and planners in the renewal of technology.

From our point of view the plan for the introduction of new technology must be raised to the rank of a state plan in order that it be ensured with material and technical resources, in order that specific times be established for all those involved. The granting of bonuses must be differentiated, depending on the volumes and times of introduction of the new technology. It is necessary to increase the size of the bonus in order to shorten the time for the mastery of new technology. It is desirable that the organizations implementing the plan with application of the new technology in the future for a definite period enjoy the advantages that go with it. The same privileges must be extended to organizations accomplishing the introduction of many-sided scientific and technical programs of the USSR State Committee on Science and Technology.

As a rule, multisided scientific-production programs have an interbranch character. It is necessary that the USSR State Committee on Science and Technology

approve programs which would indicate more specific times for the development of planning-estimate documents by planning and scientific-research institutes, assurance of financing, delivery of equipment, apparatus and materials. After approval the program must incorporate all those involved into the state plan. Implementation of the program must be regarded as one of the principal technical-economic indices for operation of an enterprise.

Only such a multisided approach will ensure a successful realization of plans for the introduction of new technology and the multisided purposeful programs of the USSR State Committee on Science and Technology. The adopted measures will favor solution of highly important scientific and technical problems.

It is evident that it is necessary to exclude from the plans for the new technology those sections which are not used in the subdivisions or which long ago became the norm and are provided for in plans.

Trusts have been assigned the task of saving materials by means of use of new materials and progressive technical solutions, but no plans provide for their material-technical support. It is necessary that these tasks be unified with respect both to the savings as a whole and with respect to the items of expenditure by means of which the required savings must be ensured.

Only the balancing of the plans for the introduction of new technology with the plans for volumes and delivery times, the raising of this plan to the ranks of a state plan and differentiated programming will facilitate accelerated scientific-technical progress.

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CSO: 1822/72

UDC 624.09.073-412

SIBKOMPLEKTMONTAZH TO IMPROVE MANAGEMENT

Moscow STROITEL'SVO TRUBOPROVODOV in Russian No 10, Oct 83 pp 11-14

[Article by G. Ye. Subbotin, "Sibkomplektmontazh" Association, Tyumen']

[Text] In the Ministry of Construction of Petroleum and Gas Industry Enterprises system successful work is being accomplished under the purposeful scientific and technical production program "Creation and Introduction of a Complex of Machines, Technology and Organization of Speedy and Continuous Construction of Main Gas Pipelines With a Diameter of 1,420 mm Under a Pressure of 7.5-12 MPa and Block-Unitized Compressor Stations for the Transport of Gas From Western Siberia to the European Center of the Country." In August 1982 the coordination council on this program adopted a resolution on change in the organizational structure of the administration and improvement in the economic relationships between the subdivisions of the "Sibkomplektmontazh" Association.

Among the various problems arising in the further development of the assembly-block construction method in Western Siberia consideration was given to one of the most important -- management of the production-technological building of projects under construction in block-box increments, construction elements and prefabricated materials in accordance with the calendar schedules for construction, the technology for the construction of production facilities and the stipulated times for putting them into operation.

In connection with the high rates of growth in work volumes (1980 -- 116 million rubles, 1983 -- 165 million rubles, 1985 -- 200 million rubles), a considerable reduction in the times required for construction in comparison with the norm, with a simultaneous increase in the number of erected objects and a changeover of the association to the construction of technologically complex production facilities (compressor stations, apparatus for the multisided preparation of gas, etc.) the entire construction-assembly system and each of its elements individually requires more efficient, uninterrupted functioning: integration of the material resources of factory production -- fabrication of block-unitized structural elements and construction components at factories of the association -- integration of projects with block-boxes, construction components, prefabricated materials and transport of project complexes to the construction site -- assembly and implementation of starting-up and adjustment work on a project.

Recently there have been more and more instances of lack of control over processes involved in the construction of projects, and especially due to the tardy and incomplete delivery of block-boxes, construction components and materials.

Prior to 1 October 1982 the system for the integration of block construction functioned on the commodity circulation supply index, which did not orient the workers of the integrating subdivisions on the final result and did not stimulate their activity in the acceleration of the times for the construction of projects. The integration trust established within the association in 1979 did not ensure the formation of effective bonds between the factories, supply bases and assembly organizations. In accordance with a decree of the Ministry of Construction of Petroleum and Gas Industry Enterprises on 1 October 1982 the integration trust was abolished and its bases in Novyy Urengoy, Surgut, Nizhnevartovsk and Komsomol'skiy were transformed into mobile mechanized columns for transport-integration work -- MMC (tiw).

The main task of the MMC (tiw) is the complete (in accordance with work integration documents) and timely (in accordance with integration schedules) production-technological integration of production facilities constructed for the petroleum and gas industry. Accordingly, the principal functions of the columns are: carrying out scheduled preventive maintenance and technical servicing of the existing supply of mechanisms and available vehicles and their efficient operation; implementation of engineering-economic preparations preceding production-technological integration; direct integration with organizations engaged in loading and unloading work and the transportation process; local fabrication of metal components (these are presently fabricated by the assembly subdivisions at construction sites) and simple block-boxes (without technological equipment, block-boxes with few components).

In order to determine the need for material-technical resources the Administration of Production-Technological Integration (APTI) of Block-Unitized Construction was established, which took in the Tyumen' integration base of the former trust, which will deal with the production program of the association, its protection in the corresponding agencies, writing of specifications, allocation and disbursing of allotted funds, and also the supplying of factories and other subdivisions of the association with the necessary resources on an integrated basis.

The mobile mechanized columns for transport-integration work through their integration sections are bringing about the work integration of projects, depending on their location, under the condition of minimizing of transportation expenditures, and are directly subordinate to the deputy general director for project assembly work (see Fig. 1) and the APTI is directly subordinate to the deputy general director of the association for material-technical support and transport.

In order to accomplish their transport-work integration functions the MMC have automobile transport, hoisting equipment, railroad sidings, warehouses and open areas for the reception of freight, equipped with fixed-position hoisting mechanisms. In order to carry out repairs and technical servicing

of machines and mechanisms the MMC have sections for scheduled preventive maintenance which have mechanical repair workshops.

Fundamentally new indices lie at the basis of the work done by the MMC (tiw): volume of commodity construction work (estimated), volume of construction-assembly work (computed). The volume of commodity construction work is the volume of work carried out in accordance with the estimated cost in the delivery of the project items to the construction site in accordance with the project work integration document approved by the association. The volume of construction-assembly work (CAW) is the volume of loading and unloading work, determined on the basis of the estimated cost, and also, on the same basis, work on the transport of block-boxes, construction elements and prefabricated material to the construction site, including expenditures on the local fabrication of items, in accordance with the quarterly (with month-by-month breakdown) schedule for project work integration approved by the association.

The work integration document regulates the number, type, make and variety of block-boxes, construction elements and materials necessary for implementation of CAW by an assembly subdivision on a complex of subcontracting work and its handing-over to the general contractor. The work integration schedule defines the time, number, type, make, variety and technological sequence for supplying all the material resources required on a work project on an item-by-item basis.

The initial data for the developing of documents relating to the supplying of work projects with block-boxes, construction elements and prefabricated materials are work lists for work projects determined by the quarterly operational-production plan, collated with clients and general contractors and approved by the deputy minister.

On the basis of the annual production program for the start-up of facilities and the quarterly plans, the assembly subdivisions, together with the MMC (tiw) for the work projects work out work integration documents and work integration schedules which are examined by different sections of the association (work integration section, production section on project assembly, industrial production section, APTI) and which are approved by the pertinent deputies of the general director.

A schedule for the delivery of block-boxes, construction elements and prefabricated materials on an item-by-item basis is prepared for the full and timely ensuring of material resources to construction projects, provided for in the work integration schedules and work integration documents. The schedule for the delivery of material resources is approved by the general director or his first deputy 15 days prior to the beginning of the planned quarter. This schedule is the initial document for the planning of the following indices: for the factories of the association -- the plan for production of block-unitized elements and construction components in conformity to the planned volume; for the APTI -- the plan for scheduling the integrated supplying of association factories with the material resources necessary for the production of block-unitized elements by these plants in a strictly defined variety, range and quantity; the plan for scheduling delivery to MMC (tiw) of prefabricated materials and construction elements in conformity to

the prescribed variety, shipped by the plants. The transport section of the association and the APTI are set the task of supplying the required volume of transport by railroad, water and air transportation facilities planned by the schedules for the delivery of material resources to the MMC (tiw).

The monitoring of adherence to the schedule for delivery of block-boxes, construction elements and materials from Tyumen' is accomplished by the production-control section of the association. The coordination of all development work, examination and approval of work integration documents, delivery schedules and the production-technological work integration of projects and monitoring of their implementation is accomplished by the section on production-technological work integration of the association.

A system of cross-calculations between assembly columns and MMC (tiw) has been developed for creating an economic mechanism bringing about acceleration of the assembly of production facilities, increasing the work productivity of assembly brigades and reducing the cost of construction production.

The following principles served as its basis.

The acceptance and delivery of material goods to the work project is formalized by an acceptance-delivery document which gives the quantity of materials and construction elements delivered to the assembly brigade. The document is signed by authorized representatives of the assembly and transport-work integration columns and is certified by the seals of the subdivisions.

The work done by the MMC (tiw) is written up at the end of each month by a document attesting to the acceptance of the construction-assembly work performed (standard form 2V with introduction of the column "cost of materials"). The signed document on form 2V is the basis for dropping of the assembly subdivision from the overall implementation (by its own resources) of CAW, regardless of how much work has been completed on a particular project.

So-called commodity construction production is formalized on form 2 after 100% supplying of the project with block-boxes, construction elements and materials in accordance with the work integration document. The primary documents for writing up a document for the acceptance of the work done on the completion of the project are the documents certifying acceptance and delivery of material resources and documents on form 2V.

The association has developed an estimated norm for determining the actually performed volumes of CAW and commodity construction work, planning and computations for work performed by the MMC (tiw). This norm is differentiated by construction regions (in the Khanty-Mansiy Autonomous Okrug it is 15%, in the Yamalo-Nenetskiy Autonomous Okrug -- 25%). This norm is applied for computations in percent of the estimated cost of the materials.

For planning the volume of CAW the norm is 9 and 15% of the estimated cost of the work performed by the assembly subdivisions for these two okrugs.

The norm is determined by subtracting from the project estimates the expenditures on transport and warehouse operations, loading-unloading and other

work associated with work integration and the delivery of project materials to the construction site. The estimated norm takes into account the transport scheme for the delivery of freight to projects and in essence reflects the standard conditional net production of the MMC (tiw), since in the work volume the cost of block-boxes, construction elements and materials is not included. However, this volume is part of the estimated cost of the work performed on the project.

The administrative interrelationships between the MMC (tiw) and the association subdivisions are regulated by contractual agreements. The MMC (tiw) draws up a contract with the assembly subdivisions for the production-technological work integration of projects in accordance with work integration documents and quarterly (broken down by months) work integration schedules. The MMC (tiw) concludes contracts with the factories for the delivery of the full range of fabricated items to the stipulated projects (in accordance with the quarterly delivery schedule) and with the APTI it concludes agreements for the delivery of prefabricated materials in the corresponding variety, range and numbers provided for in the quarterly schedule.

In the event of nonsatisfaction of contract obligations the defaulting party bears financial responsibility. The amount of the penalties, the sequence and time for concluding the contracts and supplying of the projects and the cross-calculations for the parties are determined by the "Regulations on the Interrelationships of MMC (tiw) and Subdivisions of the 'Sibkomplektmontazh' Association" prepared and approved by the association.

The association has developed the enterprise standard "Sequence for the Delivery and Acceptance of Factory Production in Assembly Work" (STP 46-83) for the purpose of forming in the association a system making it possible to monitor the flow of industrial production from the factory gates to the construction sites and to formulate the conditions for the invariability of material and disciplinary penalties for the ruination and loss, as well as unacceptable quality of block-unitized structural elements and construction components hidden by the factory. This standard provides for the sequence for delivery and acceptance of production by factories, the transport of block-unitized structural elements with a breakdown for all the stages of the transportation process, acceptance and storage of production at the MMC (tiw), transfer of production and technical documentation to it by assembly subdivisions, and also presentation of claims and assignment of responsibility for ruination and incompleteness of block-unitized structural elements. The position of master has been introduced into the T/O of the MMC (tiw) for the visual reception of block-boxes and structural elements at Tyumen' from the factories. This master will be the authorized representative of this column and will be endowed with the appropriate rights.

A system of planning and evaluation indices for all participants in the construction process has been established for the formation of an administrative mechanism having an economically advantageous effect on the final result, the putting of complexes of subcontracted work into operation. The principal indices of this system are summarized in the table.

The mechanism for evaluation and economic stimulation [granting of bonuses] of personnel orients the productive activity of each participant in the construction process on the project. For example, the evaluation of activity of the APTI is based on the implementation of the work integration schedule by the subdivisions with respect to the list of tasks approved by the association. The activity of the work of factories is evaluated on the basis of implementation of the plan for output of block-unitized structural elements in the required numbers for stipulated projects (project allocation). The evaluation of the activity of MMC (tiw) is accomplished in relation to the required implementation of the schedule for complete supplying of projects with material resources. These indices are taken into account when summarizing the results of socialist competition among the subdivisions of the association and are fundamental in awarding the Challenge Red Banner, Certificate of Honor and monetary awards.

The mechanism for the granting of bonuses was developed in the following way: all the participants in the construction work are assigned a "cost evaluation index" which orients the personnel of production subdivisions on satisfaction of the work integration schedules, the plan for output of industrial goods in the required quantity for stipulated projects and the plan for the handing-over of finished work to general contractors. Accordingly, for the APTI a fundamentally new evaluation index was introduced which does not reflect the volume of work done in general, but the volume of complete deliveries in cost terms, in accordance with the approved schedules for integration of the material resources of factories and MMC (tiw); for factories the index is the actual volume of production, representing the volume of block-unitized structural elements in the required numbers for stipulated projects delivered to the MMC (tiw) in accordance with the item-by-item list for the production of unitized components.

The funds for the granting of bonuses for the subdivisions of the association are formed in large part from the profit gained as a result of production work.

The so-called "material approval" fund is the source for granting of bonuses to personnel. The "Instructions on the Awarding of Bonuses to Workers of the APTI, Factories, MMC (tiw) and Assembly Subdivisions for Economic Activity in 1983" developed by the association included a mandatory condition for the awarding of bonuses (see table) in which the source for material rewards for the personnel of each of the considered subdivisions is the fulfillment of the plan with respect to the volume of production ("commodity circulation" in complete deliveries, realization of industrial production from the output of items in the required numbers, commodity construction production).

The experience of work under conditions of an economic experiment revealed a number of shortcomings and problems. In creating the new MMC (tiw) the association had no method for planning and calculating the work indices, the volumes of CAW and "commodity" contruction work, costs and profits. The method employed by the association at the present time does not fully correspond to the requirements of economic science and the instructions approved by the USSR Central Statistical Administration on calculation of work indices.

For example, until now the ministry plans the number of workers and the wages for the MMC (tiw) under the category "other forms of production," but the association assigns to these MMC the indices volume of CAW and volume of "commodity" construction work, regarding the MMC as subdivisions of the basic production organization. There has been no solution of the problem (in methodological respects) of the reflection of the volumes of work done by the MMC (tiw) in bookkeeping documents.

The estimated norms developed by the association for the volumes of work performed by the MMC (tiw) require further development and especially improvement in the method for their determination. Qualified assistance has not been received from branch institutes with respect to these problems.

The association is in great need of assistance from the ministry for solution of the problems which arise.

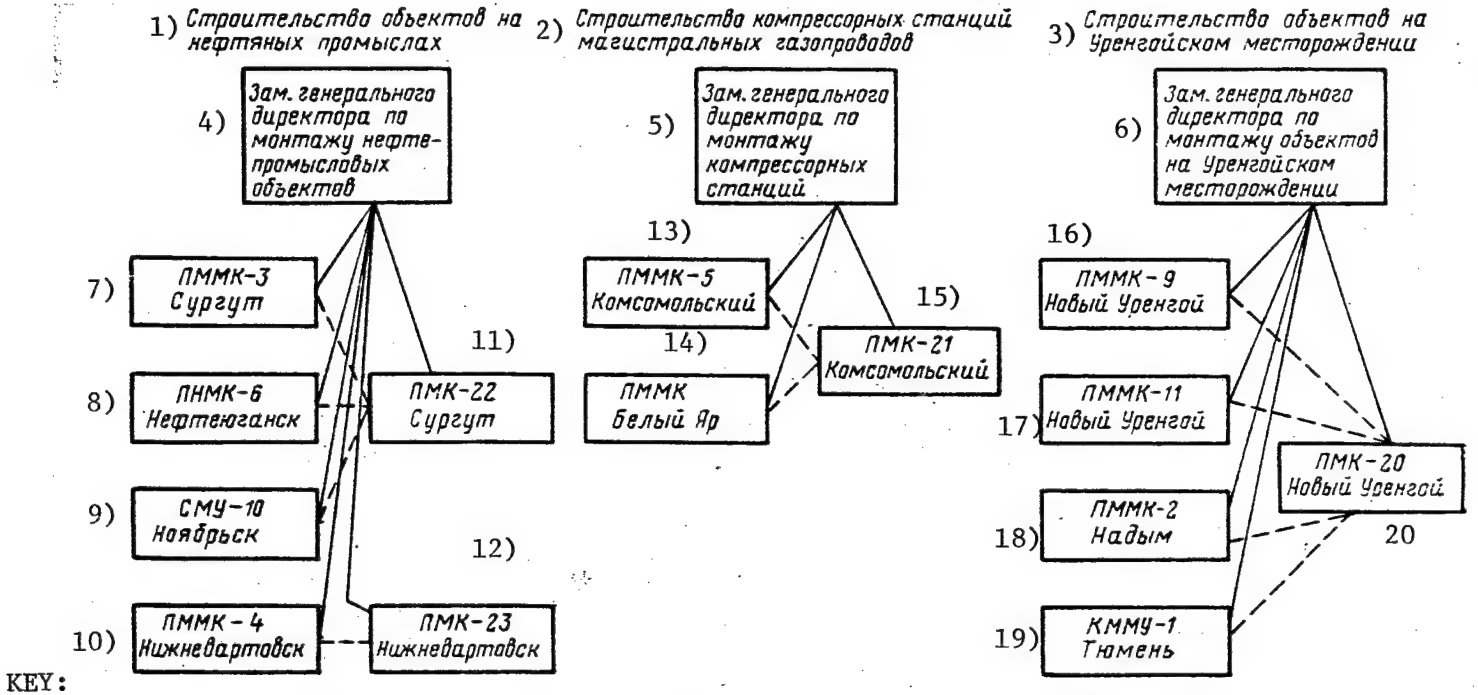
The association has difficulties of an organizational character. The inertia of thought of some engineering-technical workers in the association headquarters and a number of directors of assembly subdivisions leads to negative consequences. One of the main shortcomings is the absence of an efficient system in the organization of development and approval of work integration schedules and monitoring of their implementation.

Today it is still difficult to evaluate the economic effectiveness of the new organizational form and the administrative mechanism for control of work integration of construction projects. But the limited experience has already demonstrated the advantages of the new system.

The changeover of the MMC (tiw) to internal subcontracting is favoring a shortening of the times required for the assembly of projects. With a lengthening of the times required for construction the assembly subdivisions experience great economic losses because the volume of work performed by the MMC (tiw) is removed from their total volume of CAW (or commodity construction work in the case of total work integration of the project) with all the consequences which follow: a decrease in work output, an overexpenditure of wages, a worsening of the principal work indices. Under these conditions the assembly organization must strive to begin the assembly of block-boxes immediately after their delivery to the work site. This means that the work invested in the factories of the association on the fabrication of block-boxes is "transformed" more rapidly from incomplete production to a "commodity."

However, in the association there has been a tendency to a more efficient use of the material resources at construction sites because the repeated supplying of a project with one form of material or another (prefabricated rolled metal, panels, etc.) also is paid for on form No. 2. There is an improvement in the use of the association's own vehicles, most of which are concentrated in the MMC (tiw). Whereas earlier the calculations between the assembly organizations and bases of the work integration trust (the owner of the cars and trucks) were based on the ton-kilometer index, which did not favor a decrease in expenditures on transport, now the expenditures on transport of project materials are included in the estimated norm, which is employed in

Organizational Structure of Control of Assembly and Work Integration Subdivisions of Association. Production-Economic Ties are Indicated by Dashed Line



KEY:

1. Construction of projects at petroleum installations
2. Construction of compressor stations on main pipelines
3. Construction of projects at Urengoy deposit
4. Deputy general director for assembly of petroleum installations
5. Deputy general director for assembly of compressor stations
6. Deputy general director for assembly of projects at Urengoy deposit
7. PMMC-3 Surgut
8. PNMC-6 Nefteyugansk
9. SMU-10 Noyabr'sk
10. PMMC-4 Nizhnevartovsk
11. PMC-22 Surgut
12. PMC-23 Nizhnevartovsk
13. PMMC-5 Komsomol'skiy
14. PMMC Belyy Yar
15. PMC-21 Komsomol'skiy
16. PMMC-9 Novyy Urengoy
17. PMMC-11 Novyy Urengoy
18. PMMC-2 Nadym
19. KMMU Tyumen'
20. PMC-20 Novyy Urengoy

Economic Indices Used in Evaluating Activity and Granting of Bonuses to Principal Participants in Construction

Indices	APTI	Factories	MMC (tiw)	Assembly subdivisions
Fundamental planning index (cost, estimated)	Commodity circulation with respect to complete deliveries	Production volume (delivery of required number of items to stipulated projects)	"Commodity" construction work	"Commodity" construction work
Obligatory condition for granting bonuses (physical evaluation index)	Fulfillment of schedules of work integration of subdivisions, item-by-item, approved by association	Fulfillment of plan for output of items in required numbers (item-by-item)	Fulfillment of schedules for work integration of projects	Fulfillment of schedules for handing over completed work to general contractor
Computation index	Total volume of commodity circulation	Volume of commodity production by own efforts	Volume of construction and assembly work	Volume of construction and assembly work
Fund-generating indices	Norm of expenditures per ruble of production; work productivity	Profit (conditional); work productivity	Profit (conditional); work productivity	Profit; work productivity

the cross-calculations. In addition, in order to strengthen economic monitoring of the use of cars and trucks for inefficient purposes (for transport of guards, for small loads, for drinking water, fuels and lubricants, etc. for assembly organizations), since 1 January 1983 there has been limitations on vehicular services. This limit, expressed in cost terms (with the year broken down month-by-month), is assigned to all assembly organizations. The use of vehicles above and beyond the established sum of expenditures must come from the wage allocations for assembly organizations. The sum of wages allocated for drivers, calculated from primary documents signed by clients (customers), is removed from the work plan and is assigned to the MMC (tiw). In the regulations on the awarding of bonuses for the current results of work it is provided that the key workers of assembly subdivisions will be deprived of up to 50% of their bonus for exceeding the limits for vehicular services.

Thus, in the association a more perfect economic mechanism has been created for the production-technological work integration of block construction, orienting the system of planning indices and economic stimuli of all participants in the construction (APTI - factories - MMC (tiw) - assembly columns) on the final goal -- assembly of projects with the minimum expenditures.

5303
CSO: 1822/72

UDC 621.643:621.791

USE OF 'SEVER-1' APPARATUS IN CONSTRUCTING GAS PIPELINES BETWEEN FIELD INSTALLATIONS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 83 p 17

[Article by N. P. Okhrimenko, Glavsibtruboprovodstroy, Tyumen']

[Text] In the exploitation of the Urengoyskoye deposit the "Sever-1" apparatus has been used in constructing the linear part of gas pipelines and collectors with a diameter of 1,420 mm and a wall thickness of 18.7 mm between field installations.

During the construction season 1982/1983 the personnel of the specialized electric contact welding administration No 58 of the Urengoytruboprovodstroy trust welded 3,291 butts or 120 km of gas pipeline from three-pipe sections, which is equal to the number of butts welded in 1981-1982.

V. A. Gavrichenkov, heading brigade II working with the "Sever-1," crossed the boundary of a thousand butts per season; brigade I, headed by N. V. Minayev, also using the "Sever-1," repeated this feat twice. The administration of the trust efficiently directed the activity of the teams, guaranteeing the electric contact welding brigades a rapidly advancing work front.

Using the "Sever-1" apparatus it was possible to construct the collectors for gas preparation plants Nos 5, 6, 7, 9 and 10 running between these installations, construct a linkup between them in the neighborhood of gas preparation plants Nos 4 and 6, carry out stand welding of three-pipe sections and render assistance to ESU-5 assemblers of the Soyuzgazspetsstroy trust on the route of the Urengoy-Pomary-Uzhgorod export gas pipeline.

With respect to the technological characteristics the extent of the gas pipelines and collectors between the field installations is small, but during the course of the winter the two brigades had to move camp nine times.

However, despite the loss of time in pulling up stakes and the equipment repair which is inevitable because of this, the brigades in general attained high production indices.

In Tyumenskaya Oblast the "Sever-1" apparatus has been in use for six years. The administration has succeeded in solving all the organizational and

technical problems involved in preparation of the route associated with use of the new welding complexes.

The rated productivity of the K-700 welding head-"Sever-1" is 6-8 butts per hour; proceeding on this basis, it is possible to determine all the other economic indices of the new welding apparatus. After two-day preventive maintenance of the welding complex the brigade of N. V. Minayev attained the rated productivity of the apparatus, in 11 hours welding 66 butts. According to 5-year averaged data the optimum productivity of the "Sever-1" apparatus is 3.5-4 butts per hour.

The high technical possibilities of the "Sever-1" apparatus and the results attained by the brigades of V. A. Gavrichenkov and N. V. Minayev encouraged the builders of pipelines to master progressive welding techniques. A brigade of welders headed by B. P. Diduk, winner of the USSR State Prize, having learned to work with the new apparatus, is being reassigned to the Urengoy-Center route. Three other brigades of the administration are awaiting receipt of "Sever-1" complexes.

A number of technical and organizational problems must be solved for the more successful introduction of "Sever-1" apparatus for electric contact welding.

It is necessary to carry out investigations of the weldability of the butts of pipes with walls of different thickness. Builders must be supplied equipment for the electric contact welding of pipes of different thickness.

It is necessary to improve the process of internal burr removal, to develop an instrument for the constant monitoring of the quality of removal of internal burr and matching of the pipe edges. In removing external burr it is desirable that a mobile hydraulic support be used for raising a string of pipes instead of a pipelayer, which creates the maximum critical loads in the butt.

Instructions are required for technical operation, for use of vehicles and the available supply of spare parts for the K-700 welding head, apparatus for external burr removal and cleaning the ends of pipes (ANG-141, AZT-141).

Experience has shown that the use of the K-594 pipe layer for the ANG as a base chassis during the winter made it possible to carry out great amounts of work and avoid any holdup in insulation-laying operations. However, the use of a heavy pipelayer is ineffective for the mentioned purposes.

It is necessary to develop the optimum variant of a base chassis. For the removal of burr it is feasible to use triangular plates with a cutting edge of 35-50 mm and weighing up to 100 g, as is the practice abroad.

The problem of centralized technical servicing of "Sever-1" apparatus must be solved. At the present time the repair of the welding head is accomplished directly along the route by the brigade with the assistance of highly qualified specialists of the Institute of Electrical Welding imeni Ye. O. Paton.

The time was long ago ripe for the writing of SUPNR [instructions] on welding techniques. During the last 5 years the mechanical and power resources of the

welding brigades increased by several times and there are not enough repairmen of any qualification.

A serious problem is the supply of the welding complex with spare parts. A high percentage of standard spare parts is absent in the supply list of the Ministry of Construction of Petroleum and Gas Industry Enterprises. Upon individual order spare parts are fabricated by the experimental plant of the Institute of Electrical Welding imeni Ye. O. Paton or the Kiev Experimental-Mechanical Plant, but this is possible only after approval of the transaction at the deputy minister level.

Improvement of monitoring of the quality of butts welded by electric contact welding is of great importance.

By contract with the Moscow Higher Technical School imeni N. E. Bauman work is being done on development of a method for monitoring and automatic ultrasonic flaw detection, ensuring registry of the results of monitoring on paper tape. There was a complete agreement of the results of ultrasonic flaw detection -- traces of the registered parameters of the welding regime and mechanical tests of samples.

The traces of the registered parameters of the welding regime reveal the general parameters of the welding regime. The nominal values of the parameters can be determined by the method given in VSN-2-72-80.

However, the interpretation of the traces of the registered parameters of the welding regime is complex and requires a high skill of the operator and monitor. Accordingly, it would be desirable that the checking of the quality of the butts produced by automatic welding be entrusted to automatic devices. This would considerably increase the effectiveness of introduction of the "Sever-1" apparatus for electric contact welding.

5303
CSO: 1822/72

UDC 621.315.6

PIPELINE INSULATION IN THE NORTH

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 83 pp 22-23

[Article by A. A. Gerdt, Glavsibtruboprovodstroy, Tyumen', and V. A. Rublev, SibNIPIgazstroy, Tyumen']

[Text] With the movement of the production of gas and petroleum into permafrost regions the number of heat-insulated pipelines is increasing. In solving the problems involved in the heat insulation of pipelines use is being made of experience in construction of heating networks in the middle zone of the country and also the experience gained at Noril'sk, Yakutsk, Vorkuta and Magadan. However, the specific problems involved in the construction work of the gas industry, which is characterized by remoteness from industrial centers, considerable extent of pipelines and a high rate of their construction, require a search for qualitatively new approaches in the heat-insulation field. Materials, heat insulation construction elements and heat insulation technology are component parts of this problem.

The heat insulation materials for pipeline construction in the northern regions must correspond to the following fundamental requirements: be transportable or be produced at the place of use, be technologically effective in the fabrication of heat insulation or in construction work, and be reliable in operation.

The requirements for operational reliability must be examined on a differential basis. There are certain special considerations for each type of laying of pipelines. For example, when laying pipelines above the surface it is necessary to take into account the degree of combustibility of the structure and when laying pipelines underground the absorption of water must be considered. The safeguarding of the thermal insulation from ignition, wetting or mechanical damage can be ensured by a combination of protective and hydroinsulating layers in the heat-insulating elements of the pipeline. The heat-insulating layer must have a compressive strength of not less than 0.4 MPa and a thermal conductivity not greater than 0.08 W/m·K with a density of 100-300 kg/m^3.

The requirement on technological efficiency must be subordinate to the possibility of rapid setting-up of field bases and take into account the need for heat insulation of pipelines of all diameters by effective methods with the broad use of highly productive continuous processes.

With respect to the transportability requirement, the objective is to obtain 20-30 volumes of heat insulation on the site from the raw material brought in. For pipeline construction this requirement corresponds to foam plastic, perlite and vermiculite.

Among the materials produced in situ at the present time we can mention porous clay filler (keramzit), used for the laying of heating networks without use of trenches.

Heating networks are usually laid in areas of concentrated construction. In the years immediately ahead there will be a considerable increase in the volume of bitumen-keramzit insulation of pipes. But even now for these purposes it is necessary to carry out experiments with more effective materials. It is possible to use charging materials of the "proteksuleyt" and "asfal'toizol" type. The use of self-sintering charges ensures the complete mechanization of installation work, does not require special machines for transport of loads and reduces to a minimum the variety of materials for the installation of heat insulation. The raw material for self-sintering hydrophobic "asfal't-oizol" is asphaltite and mazut.

The heat insulation of pipeline communications above-ground for compressor stations (CS) and plants for the multisided preparation of gas (GPP) with a temperature of the transported agent up to 150°C can be accomplished using FRP-1 and FPB foam plastics which are not easily ignited. The construction work has only mechanical protection and does not require hydroinsulation because the moisture absorption of these foam plastics at 95% air humidity is only 2% by volume.

Compressor station and gas preparation plant communications can be thermally insulated by prefabricated foam plastic segments, making provision for subsequent protection with metal foil, or they can be assembled from pipes with foam plastic, foamed into an axially arranged metal sheathing, wound on with a "Nokiya" machine. The technology of thermal insulation of pipes with use of a sheathing is being perfected by the Tyumen'gazmontazh trust. The branch is receiving raw material in adequate quantity for performing this type of work.

The thermal insulation of loops which are laid underground here has already been accomplished by the Spetsneftegazstroy trust. Loops having a normal anticorrosion insulation have been covered with segments of foam polyurethane or polystyrene and have been wrapped in PVKh film in two layers. In 1982 the trust processed more than 2,000 tons of foam plastic raw material. About 3,000 tons of such raw material are required each year for the thermal insulation of loops in the Urengoyskoye deposit. This is evidence that in order to ensure the required volumes of thermal insulation in the immediate future it is only necessary to augment the productivity of existing shops and sections engaged in the fabrication of thermal insulation.

In the future for industrialization and increasing the quality of thermal insulation of loops and other heat-carrying lines of intermediate diameters, on the basis of the continuous technology developed by the SibNIPIgazstroy it is necessary to create mobile field bases in order to bring them closer to the

point of assembly and reduce the distance of transport of heat-insulated pipes. The small-size apparatus developed by the Tyumen' Affiliate of the Special Design Bureau "Gazstroymashina" can be held in special containers which lock together.

The economic feasibility of using foam plastics for the thermal insulation of loops was demonstrated earlier*. The cost of production of foam plastics is greater than that of traditional heat insulators (bitumen-keramzit, minerized items). However, a savings is attained in other spheres of social production -- in the transport of the raw materials for foam plastics and in the process of thermal insulation of pipelines, the labor requirement for which is reduced by 38%. Whereas the thermal insulation of loops with bitumen-keramzit requires 236 man-days, with the use of foam plastics only 146 man-days are required (scaled to 1 km of length). As a result, for each kilometer of pipeline there is a saving of 6,800 rubles. A changeover to a continuous form of technology and mechanized assembly will ensure an additional reduction of work and financial expenditures.

The thermal insulation of underground collectors with a diameter of 1,420 mm between installations is the most complex. In the underground variant there can be two heat insulation methods: assembly of intact elements on the surface of the line or placement of screening slabs on the bottom of the trench. These variants are given as alternatives because it is yet to be determined whether the slab will always be beneath the axis of the pipe when there are movements of the line with changes in pressure and with the admissible thawing of the permafrost ground. Accordingly, for the time being preference must be given to heat-insulation constructions attached to the surface of the pipe. Similar solutions are being proposed by foreign companies. However, the difficulty in their use is that the protective layers of heat insulation segments during assembly must be carefully welded or rolled. The practical realization of these solutions is possible in an autonomous hydrophobization of each polyurethane foam segment with a bitumen emulsion**. The use of segments protected against moistening over their entire surface precludes the time-consuming operation of hermetic protection, which is extremely complex along the route of pipe laying, of a heat-insulated pipeline of a large diameter. If the segments are first attached to a common flexible base, pipe-laying manipulators can be used for their assembly.

Screening slabs of vermiculite, bonded by polyethylene, are being developed for the heat insulation of main-line pipelines. In the forming of samples by a change in the volumetric content of polyethylene from 25 to 35% a compressive strength of 0.6-1.0 MPa is imparted (the computed strength of the slab on rigid ground under a pipe with a diameter of 1,420 mm is 0.5-0.7 MPa).

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* Karagin, I. D., Bulatov, V. S. and Tandalov, V. V., RAZVITIYE GAZOVOY PROMYSHLENNOSTI SEVERA TYUMENSKOY OBLASTI (Development of the Gas Industry in Northern Tyumenskaya Oblast), Moscow, Nedra, 1979.

** Rublev, V. A., "Use of Segments for Heat Insulation of Main-Line Pipelines," STROITEL'STVO TRUBOPROVODOV, No 5, 1976.

The advantages of such slabs is that they consist of only two components. The industrial production of raw material has been organized and in addition it is transportable. The binder is polyethylene, which in contrast to amorphous bitumen has a stable shape. However, for the time being there are great expenditures of energy in their fabrication.

The thermal insulation of main-line pipelines aboveground, employed in the transport of heated petroleum, can be based on mineralized coverings. In the overall balance of heat-insulation materials in the USSR mineralized items constitute more than half. This percentage will remain for a long time because they have a minimum cost. They have the following properties: the thermal conductivity coefficient is 0.07 W/m·K, the strength of the solid slabs can be 0.1-0.3 MPa and the density is 200-300 kg/m^3. The production of new items has been organized in the country: solid and "lamellar" mineralized slabs. The practice of fabricating mineralized semi-finished items in the form of granules is also known. The granules are easily injected into closed cavities through small openings. Accordingly, the process can be mechanized from unloading to ejection into the shell situated around the pipe. At the SibNIPIgazstroy the granule ejection method has been tested under polygon conditions. For heat insulation on the "pipe in a pipe" principle it is possible to use a sheathing with a diameter from 100 mm to 2 m wound by the "Nokiya" machine.

Thus, it is necessary to broaden the production base for heat insulation of northern pipelines with foam plastics and bitumen-keramzit on the basis of tested technical solutions. Even today it is necessary to improve and diversify new materials, structures and methods for heat insulation which in the future will ensure increasing volumes of construction of thermally insulated pipelines.

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CSO: 1822/72

PIPELINE CONSTRUCTION

NEW GAS PIPELINE UNDER CONSTRUCTION IN MOSCOW

Moscow SOVETSKAYA ROSSIYA in Russian 22 Jul 83 p 1

[Article by R. Yevseyeva: "The Capital's Gas Belt"]

[Text] Subdivisions of the Trust "Mosgazprovodstroy" are carrying operations to build sections in the Moscow area of the new underground trunk line which in future will become the second line of the gas pipeline that now rings the city.

If you look at a chart of the country's transportation pipelines, you see that many of them pass through Moscow. Among them the first, from Saratov to Moscow, and those which go from Central Asia and the Northern Caucasus, from West Siberia.... All of them, merged together, make up an underground ocean of gas. The pipeline around the capital has made it possible not only to regulate the arrival of gas responsively, it has at the same time become a kind of a one-of-a-kind storage facility of the blue fuel.

Its importance cannot be overestimated. It provides raw materials and energy for enterprises, lighting and heat to homes. Gas consumption in the oblast containing the capital has been growing year after year, and transit flows--to the north and west--have also been gaining in volume. That is why the pace of construction of facilities in the fuel and power industry have been stepped up, and there is an increase in the number of underground arteries connected to the Moscow gas ring. Second lines--large-diameter pipelines--are being laid in sections with an especially heavy load. We visited one such section in the district of the Serpukhov compressor station.

... The radio in the little field office is crackling away as usual. Outside the windows the rows of caravans and "barrels" are where the builders of the underground trunk lines live in the field. Yet this place is located half an hour's drive from Moscow.

"It is a very complicated job to lay gas pipelines in the Moscow area," says Viktor Aleksandrovich Nazarov, deputy chief of SU [Construction Administration]-14. "For example, in our section there are about 70 intersections with various roads and underground lines in 38 km. In addition, there is plowland: careful recultivation is required."

Instead of the usual scale, when the uninterrupted line of pipe must extend, for example, over hundreds of kilometers in the expanses of Siberia, thorough and painstaking work is required in every meter. That is why experienced and distinguished builders work here, true masters of their work. Such as the brigades of the welders Yevgeniy Frolov and Gennadiy Lobastov, the brigades of installation fitters of Viktor Zenkin and Mikhail Yakovlev....

Roads probably take the first place on the list of complicated intersections. This is understandable--the places along them are inhabited and livelier. The work of the pipeline builders must not interfere with them, the uninterrupted flow of traffic cannot be suspended for even a day. That is why the builders have a specialized service--crossing brigades. This service is headed by Petr Mikhaylovich Karpenko. Local roads are tunneled under by horizontal drilling, and major highways by the method of pipe driving. But even here problems arise--the high level of groundwater. Quick ground does not offer a minute's respite, it compels serious concern with the problems of water penetration....

The route of the pipeline in the Moscow area. In a pleasant and highly populated area. Although the builders of the Trust "Mosgazprovodstroy" are accustomed to work far from their homes, sometimes thousands of kilometers away--this section may be small, but for them it is a particularly responsible one.

7045
CSO: 1822/84

PIPELINE CONSTRUCTION

FRENCH REPORTS ON URENGOY-UZHGOROD GAS PIPELINE

Moscow ZA RUBEZHOM in Russian No 32, Aug 83 p 7

[Articles reprinted from French periodicals: "In Defiance of the Sanctions, in the Interests of Cooperation"]

[Text] The last hundreds of meters of pipe have been laid on the gas pipeline route from Urengoy via Pomary to Uzhgorod. Completion of this stage ahead of schedule in building the transcontinental trunk gas pipeline, the longest in the world, is a glorious exploit of the Soviet people and vivid evidence of the high level of the domestic industry. The flow of Soviet gas through the trunk pipeline will begin on schedule, in spite of all the attempts of the American administration to interfere with construction of the gas pipeline and development of areas of cooperation related to it between the Soviet Union and the countries of western Europe.

Last Kilometers of Pipe Have Been Laid

[Article by Gerard (Strayf) reprinted from L'HUMANITE, Paris]

The laying of pipe has been completed on the route of the Urengoy--Pomary--Uzhgorod gas pipeline. The solid line of gas pipe joined, welded, insulated and laid underground has stretched over a distance of 4,451 km. This operation was accomplished in record time--in just 14 months.

Everything in the construction of this gas pipeline was on a truly gigantic scale. It is sufficient to say that 3 million tons of pipe were laid, about 130 million cubic meters of earth were moved, the builders had to cross 800 water obstacles and to lay 200 km of underwater pipeline.

The gas pipeline starts at Urengoy, in the northern regions above the Arctic Circle, in the bogs and permafrost. The temperature there in the wintertime drops to -50° [C], in summer there are the endless swampy bogs and mosquitoes. Just a few years ago large reserves of natural gas were prospected here. Since that time an entire city has already grown up here. In 1985 six gas pipelines will deliver Urengoy gas to the country's western regions.

The gas pipeline from Urengoy to Uzhgorod is the longest gas pipeline in this series, its fourth in order. The first three are already on stream. Work has begun on construction of the last two.

The transcontinental gas pipeline, which has crossed major rivers such as the Ob (3 km wide), passes through the Ural Mountains, drops down into the Russian plain, crosses the Volga, climbs up into the Carpathian Mountains and runs to the Czechoslovak border.

In what section was construction the most difficult? "The work was not easy in any of the segments," we were told in a recent interview by A. Vesel'yev, deputy minister of construction of petroleum and gas industry enterprises. Nevertheless, the schedule was met and exceeded by 6 months. It is especially important to emphasize this, since, as is well known, the United States carried out an intensified campaign of pressure on its trading partners, attempting to interfere with construction of the gas pipeline. Washington called upon the Western countries to boycott deliveries of equipment to the USSR. These maneuvers ended in failure. France refused to submit to the American dictate, and other Western states behaved likewise. The American attempts to introduce an embargo resulted only in undermining the reputation of the European countries as trading partners, and the Soviet Union began to develop more intensively and extensively its own technology in this field.

Thus the laying of the pipe has been completed. It remains to finish construction of the compressor stations. Located every 100 km along the entire route of the gas pipeline, their purpose is to cool and pump the gas. The plans call for putting 40 such stations into service; small settlements will spring up around them. There will be 18 stations put into service this year, and the rest in early 1984.

The section of the gas pipeline from Urengoy to Sverdlovsk, along which gas is being supplied to many enterprises on Soviet territory, is in operation even now. Thus everything indicates that the work will be completed ahead of schedule and that next spring Paris will begin to receive its 8 billion cubic meters of Soviet gas.

[Box]

The building of the gas pipeline from Siberia to western Europe will be completed by early 1984, that is, precisely according to the schedule for beginning of delivery of Siberian gas to western Europe. This indicates that the maneuvers of the United States, which tried everything possible to hinder construction of the gas pipeline, experienced utter defeat.

LE MONDE, Paris

Exploit of the Builders, Advances of Soviet Technology

[Article by Patrick Bergaud reprinted from FRANCE-URSS MAGAZINE, Paris]

Construction of the gas pipeline began last July, and an average of 370 km of pipe have been laid monthly. But that figure is not enough by itself to give a complete idea of what has been accomplished. If one is to correctly evaluate the work that has been done, he must remember the kind of difficulties

and natural obstacles that were encountered along the route of the pipeline. Two mountain ranges had to be crossed--the Urals and Carpathians, and the pipeline had to be taken over approximately 600 streams, including such large rivers as the Ob, the Kama, the Volga, the Don and the Dnieper, as well as across lakes and reservoirs.

The most difficult and crucial section of the route was the first 1,000 or so kilometers from Urengoy. The bogs make that area of West Siberia impassable during all the summer and autumn months. Only in the wintertime, when they freeze, can machines move over them. The work had to be done day and night at a temperature of 40° to 45° below zero [C]. Last year the long warm fall allowed operations to begin in this area only in December, after a delay of 2 months. And then in order to complete construction of this segment of the pipeline before spring came, the people began a real race against time. This was the most intensive period of construction. About 50 brigades were employed there, and it took all the knowledge and experience which the thousands of highly skilled workers had acquired in building the previous Siberian gas pipelines to lay about 500 km of pipe in each of those 3 winter months.

Construction of this gas pipeline is not only an exploit of the people who built it, but also an outstanding technical achievement. To dig 4,451 km of trenches, it was necessary to move 130 million cubic meters of earth and rock, and special machines had to be created for that purpose, which was also the case for transport and welding of the pipe.

In the last 5 years more than 130 new types of machines, pieces of machinery and equipment related to gas pipeline construction and operation have come into being in Soviet design offices and plant shops. We will mention, for example, the 300-HP excavators which can excavate even frozen earth at a rate of 1,200 cubic meters an hour. A cross-country vehicle on rubber-metal tracks, which was given the name "Tyumen," was created for the areas of the Far North and West Siberia. It is able to cross the bogs with a payload of more than 30 tons. The "Sever-1" [North-1] automatic machine for electric resistance welding, developed by Ukrainian researchers at the Institute imeni Ye. Paton in Kiev, welds a joint in only 4 minutes. It welds 6-8 joints in an hour, including all the auxiliary operations and checking the seal, that is, in that time it does the weekly quota for a highly skilled welder. Three such units were used on the northern section of the Urengoy--Pomary--Uzhgorod gas pipeline.

As for the pipe, its production had to be increased and its quality improved so that it could withstand a pressure of 75 atmospheres. Pipe with a diameter of 1,420 km was used in order to increase the flow capacity of the gas pipeline. We should note that specialists in this field are continuing to search for new materials. One of the most highly promising solutions is the creation of multiply pipe made from low-alloy metal, which is capable of withstanding a pressure of 100-120 atmospheres. A shop for the production of such pipe has recently been put into operation at the Vyksa Metallurgical Plant, and it soon will be able to manufacture about 1 million tons of it per year.

Finally, to maintain the necessary pressure along the entire length of the gas pipeline 41 compressor stations will be built. Their total capacity will be 3,000 MW. Plants in the Ukraine and the Urals will deliver turbines with a capacity of 16 MW, and the Nevskiy Plant in Leningrad will undertake to manufacture turbines with a capacity of 25 MW.

There will be six gas pipelines built from the Urengoy deposit, and this is only a part of the project for transport of natural gas from West Siberia to industrial centers of the USSR. The first of the six gas pipelines between Urengoy and Moscow went into service in 1981. The Urengoy--Petrovsk gas pipeline, which is 1,731 km long, was put into service in 1982 and is now operating at full capacity.

The Immense Scale of the Energy Program

The laying of the gas pipeline from Urengoy to Novopskov has already been completed, and it will go into service by the end of this year. Construction of another two gas pipelines, from Urengoy to Kursk and from Urengoy to Yelets, will also begin this year, and plans have already been made for building still another, a seventh. No other country has undertaken a program on such a scale. It is necessary for an annual delivery of an additional 200 billion cubic meters of gas to consumers which West Siberia will furnish by 1985, which will make the USSR the world's largest natural gas producer.

The association "Nevskiy Zavod" in Leningrad has undertaken series production of a new gas pumping unit, the GTN-25, which has no equal in the world with respect to many parameters. The plant recently shipped the first unit in this series to the route of the export gas pipeline.

In an interview with the Novosti wire service Viktor Krotov, USSR minister of power machinebuilding, spoke about development of this unique unit designed for trunk gas pipelines.

The first full-scale prototype of the GTN-25 was tested in 1979. After the American embargo its series production had to be started a year earlier than intended.

This was a complicated job both in its conception and also in its execution. The new model was not created from scratch. The units manufactured by the association "Nevskiy Zavod" have been pumping 75 percent of all the gas produced in the Soviet Union. But development of the completely new turbine capable of pumping tens of millions of cubic meters of gas per day at a pressure of 75 atmospheres in pipes with a diameter of 1,420 mm represented an extremely complicated matter; the output of the unit had to be increased 2.5-fold while its weight and size were kept within the allowable limits.

In the USSR, as in many other countries, gas pipelines are being built in out-of-the-way and sparsely settled areas. Quite often it is very difficult to deliver the necessary equipment there and to set it up on the spot. That is why every piece of machinery, every unit or motor must be distinguished by maximum reliability, power and output and at the same time must have the lowest possible weight and outside dimensions.

They managed in the USSR to create a new gas pumping unit that met those requirements. In order to obtain high output, it is customary to increase the temperature of combustion of the gas ahead of the turbine. Although the temperature is 100-200° less in this unit than in units of similar capacity manufactured abroad, its output is higher.

As a result of this drop in temperature the reliability of equipment is increased. The blades of the turbine's rotor are the most vulnerable place, since they experience sizable mechanical, thermal and chemical effects. Specialists of the "Nevskiy Zavod" have created an alloy which guarantees the operation of the blades for 100,000 hours--that is, more than 11 years. Whereas special cooling is used in most turbines to extend the life of the blades, in the GTN-25 this is not required because of the lower temperature at which the fuel is burned.

In addition, it was found possible to reduce the amount of nitrogen oxides in the exhaust gases to between one-fourth and one-fifth of what they are in existing units thanks to invention of an original annular combustion chamber.

The Soviet method of burning the fuel has been patented in many countries, and various firms have already expressed a desire to acquire the patent to produce this or that assembly in the GTN-25 turbine and supercharger.

In 3 or 4 years construction will begin in the USSR of the first gas pipelines operating at elevated pressure (on the order of 100 atmospheres), which will make it possible to increase their flow capacity by approximately 40 percent. The construction cost of the compressor stations will be reduced by 10-15 percent thanks to the increased size of the units. Construction time and manpower requirements will be reduced. There will also be a reduction in station maintenance and operation. In addition, there will be a saving of metal and fuel. Development of the GTN-25 turbine is an important step in that direction. The new gas pipelines need new and still larger units. In that context the GTN-25 turbine will be the prototype for a whole family of gas turbines. Without radical modification, but only by adding some new parts and assemblies, it is possible to build new units which are considerably more powerful and considerably more productive.

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CSO: 1822/84

PIPELINE CONSTRUCTION

MESSOYAKHA-NORILSK PIPELINE

Moscow STROITEL'NAYA GAZETA in Russian 30 Sep 83 p 3

[Article by A. Trofimuk, Hero of Socialist Labor, chairman of the Scientific Council of the Siberian Branch of the USSR Academy of Sciences for the Problems of Development of the Petroleum and Gas Complex in Tyumen Oblast, member of the academy: "For the First Time in World Practice"]

[Text] Mingazprom [Ministry of Gas Industry] and Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] have nominated for the 1983 USSR State Prize the team of innovators who worked to solve one of the most important problems of the national economy--developing scientific-technical solutions that would for the first time in world practice guarantee construction under the extreme conditions of the Arctic Circle the complex of installations for reliable gas supply to the Norilsk Mining and Metallurgical Combine.

The work consisted of the interrelated solution of such exceedingly important problems as discovering and preparing in a short period of time large gas deposits in the vicinity of the city of Norilsk, supplying this fuel to meet the needs of the Norilsk Mining and Metallurgical Combine, thanks to the rapid development of the Messoyakha deposit and construction of the Messoyakha--Norilsk gas pipeline.

Today it can be boldly stated that the world's northernmost gas field was created under the most complicated conditions of the Arctic Circle for the first time in world practice on the basis of fundamentally new engineering solutions and in a short period of time, and that a trunk gas pipeline was built that fully satisfies the natural gas needs of the Norilsk industrial region.

This was a complicated problem to solve primarily because of the difficult engineering-geological, hydrogeological and climatic conditions of the region where the deposits were developed and where the gas pipeline was built. It is sufficient to mention here the permafrost, the large number of bogs, lakes and rivers, and temperature fluctuations from -50° C to +30° C.

Construction of facilities for production and transport of the gas under such complicated conditions became possible thanks to creative development and

application of new pipeline laying systems. A new above-ground system of laying the pipe was created to carry the gas; it made it possible to build a gas pipeline on the principle of preserving the earth of the foundation in its frozen state. Moreover, to speak specifically, an interrelated set of problems having to do with the normal operation of pipelines at temperatures down to -60° C, welding them at low temperatures, protecting them against corrosion, and so forth, were solved.

Today the productivity of the system of gas pipelines has reached 5.2 billion cubic meters of gas per year. Its use at the Norilsk Mining and Metallurgical Combine has made it possible to increase the output of principal technological processes 25-30 percent and to make more than 8,000 underground miners employed in mining coal available for use in mining the ores of nonferrous metals. A number of social problems were also solved. Above all, working conditions were improved, emission of ash into the atmosphere and discharge of sewage into bodies of water were reduced. Between 1970 and 1982 the total economic benefit from use of the natural gas exceeded 7 billion rubles.

The fundamentally new scientific-technical solutions in building this unique gas pipeline system, which practical experience has tested for more than a decade, have not only justified themselves, but they also have been disseminated more widely. For example, they are being used in developing the deposits in the Arctic and in construction of large gas pipeline systems being laid in the regions of the Far North.

This work is an example of the interdisciplinary scientific approach to solving an important problem of the national economy. There is every reason to refer to it as pioneering in the field of building gas pipeline systems under the extremely complex conditions of the Arctic.

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FINANCIAL, OTHER INCENTIVES FOR PIPELINE WORKERS

Moscow LITERATURNAYA GAZETA in Russian No 40, 5 Oct 83 p 13

[Article by An. Shakhov, LITERATURNAYA GAZETA correspondent]

[Text] "Thrifty generosity": this is not a play on words, but a practical attainment.

The events about which we want to tell developed in three sectors of construction of the Siberian - Western Europe pipeline which have been completed ahead of time. This is one of the noteworthy results of the first stage of the economic and social experiment devised at the Ministry of Construction of Petroleum and Gas Industry Enterprises: there has been an increase in the wages of the pipeline workers on the average by a factor of 1 1/2, but at the same time the cost of construction in the experimental sectors was cheaper than the computed cost by 1,600,000 rubles.

A paradox? In any case, it's worth looking at...

This was the concern of our correspondent, continuing publication of materials on the relationship between work productivity and wages (LITERATURNAYA GAZETA, No 31, 1983).

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In the course of the visit I was first introduced to the deputy minister A. P. Vesel'yev. Anatoliy Pavlovich speaks in an unusual manner: he avoids adjectives, giving preference to facts and figures.

In listening to him I think that it is impossible to understand the situation without understanding people, their experience in searching, in wandering along the difficult roads of life. From time to time these are wanderings in the literal sense of the word -- through swamps and through the taiga. Here, at the headquarters of the branch, there are a good many directors whose dedication and purposefulness of whose actions is essential for their difficult professional tasks. The pivotal contingent of specialists heading the Ministry of Construction of Petroleum and Gas Industry Enterprises are "Tyumen' population" people. By the beginning of the experiment there were seven of them on the board of the ministry.

The first lesson in management was afforded by Nature itself: the "setting up" (as the professionals say) of each construction worker along pipeline routes in the high latitudes costs 20,000 rubles! In such regions slipshod work costs a pretty penny. And overemployment of manpower and a rapid turnover of personnel are ruinous.

In the cold environment of the polar regions the strategy of these organizers, directed to increasing work productivity, was "hardened."

Now, down to business. What is the essence of the experiment? Why is it of value from the point of view of the initiators of the experiment? And what are the first results?

B. Ye. Shcherbin (Minister): "Multidiscipline technological production line teams (MTPLT) in the modern form in which they are operating for the first time were established on the pipeline route Urengoy-Pomary-Uzhgorod. Here we are constructing a superpipeline and are shaping a new type of builder. The teams are charged with an enormous potential of creative energy. The utilization of this energy, the revealing of individuality, such is the task. The MTPLT is something like a large brigade, a team performing a variety of tasks and aimed at a final result -- delivery of a finished product. Accordingly, joint concern arises concerning the quality of preceding and subsequent operations, concerning the efficient use of equipment. In the team there is the most complete expression of the possibilities of the fundamental principles of socialist management. This is the most democratic element of management. Here everything is solved by the group."

Yu. P. Batalin (Chairman of the USSR State Committee on Labor and Social Problems): "In actuality, the experiment conducted and all the organizational restructuring of pipeline construction is based on three organizational-economic principles, or one might say, 'on three cornerstones'.

1. Brigades of welders, earth movers, insulation workers, ballast workers, specialized by individual types of work, technologically rigidly bound together, earlier were subordinate to different construction administrations; now they have been linked together into a unified administrative formation -- the multidiscipline technological production line team (MTPLT). Due to such an organizational decision there has been a marked simplification in the coordination of work and an increase in synchronization of the actions of builders, without any wasted work.

2. The personnel of the MTPLT are piecework and temporary workers who together with engineering and technical personnel have been shifted to a contract method of organization and work payment. An agreement concluded with the trust defines the times for implementation of tasks, requirements on the quality, quantity and times of delivery of material resources and cost of construction of one kilometer of pipeline.

The work is considered finished after the delivery of a sector by a worker or the state commission. If the pipeline is handed over in time, the MTPLT is paid the corresponding bonus. The MTPLT has the right to execute its mission

with any number of personnel without changing the agreed-upon cost of construction of one kilometer.

The experience of work of such large groups, including engineering-technical workers, operating on the brigade contract principle, is unprecedented in our country.

The results exceeded all expectations: individual teams in one year have constructed 200 kilometers of pipeline, whereas in the last five-year plan the average construction during the year was 45-46 kilometers. At the same time the wages of team workers increased by a factor of 1.3-1.5.

3. In pipeline construction there is a changeover from specialization by types of work to specialization by stages of the production process. For this purpose, in addition to MTPLT, construction subdivisions of a new type have been created, MMC, mobile mechanized columns performing road, transport, engineering and other specialized types of work.

The principal effect obtained as a result of all of this is a considerable increase in the work and creative activity of people."

The judgment on the experiment after consultation with the Central Committee of the Trade Union of the branch and the USSR State Committee on Labor and Social Problems was made by the coordination council of the ministry. The chief of the work and wages administration, Yuriy Romanovich Anpilogov, showing me one of the council documents, seemingly noted by chance: "In the branch they are called 'steel,' from the color of the bindings." I understood what was possibly his involuntary allusion: the "steel documents" reflect the qualities of determination of the initiators of the experiment and therefore indisputable authority is embodied. I read, in particular, the following:

"The combination of subdivisions carrying out the principal types of work on the construction of pipelines with a diameter of 1,420 mm into a self-sustaining unit -- a multidiscipline technological production line team, operating shoulder-to-shoulder, will make it possible to the greatest degree to realize the principles of collectivism and interchangeability, and also will create prerequisites for the introduction of the Shchekinskiy method into pipeline construction. In addition, in this case there is a decrease in the number of control levels and a reduction in the need for administrative personnel."

The document was signed by Yu. P. Batalin, at that time chairman of the council and first deputy minister.

What led to the appearance of special concern for implementation of the principles of collectivism?

Yu. P. Batalin: "The work team, oriented on the attainment of the result required by the state, has an enormous strength. Precisely in this case real conditions are created for transforming 'my' to 'our.' Experience shows that small brigades, carrying out individual processes, do not have such a strength. Members of brigades waiting for hours for 'auxiliaries' to make an opening for them have spent their time building scaffoldings or collecting rubbish (in short, just fussed around) without being conscious of purposeful interests of

the state and respect for the work of their comrades performing related work. The contract, like a knife, cuts away these shortcomings. It dictates the need for attaining the end result. The contract is encouragement for the economizing of everything: time, work and number of personnel, materials and fuel, horsepower, kilowatt-hours and vehicles. Bonuses are also awarded for attaining all this. Having a material effect on the moral climate of the group, such a form of organization and payment of wages increases the smoothness of operations and makes them purposeful. The contract knocks the ground from beneath self-interest, sloppy work and overemployment of personnel..."

Thus, there is an attack on professional egoism, with setting of sights on the collectivization of labor. In its time such a striving gave rise to the "Kaluga variant." However, in the new experiment we were first and foremost interested in how it differs from its predecessor, its specific features.

The pipeline route is a wilderness. The builders attack it with "landing parties." The term is not accidentally a military one; the work conditions are out-and-out "combat" conditions. Usually 200-300 specialists -- workers in the principal trades and auxiliaries, engineers and supervisors are sent here for a good long time... Here the group, "closed within itself," operates under the direct pressure of the severe and frequent caprices of the elements. The almost 4,500 kilometers of route of this pipeline also included the forcing of the Ob', Volga, Kama and Dnepr. Over a 200-km distance the pipes plunged under water. They clambered along the mountain slopes of the Urals and Carpathians. Add 150 kilometers of permafrost and another 700 kilometers of swamps and bogs. The pipeline layers raised and returned to place 130 million cubic meters of earth! And what is the total length of the welded seams? 2,200 kilometers!

Indeed, the reader can see that it is difficult to keep from the temptation to become absorbed with these impressive figures. But we will return to the experiment. The brigade contract is strengthened here in that it also includes engineers.

As has been established by sociologists from the NIPIorgneftegazstroy, in the branch the wages of engineering and technical personnel on the average lag behind the wages of workers by 30%, whereas masters receive even less -- their wages are only one-third of those of workers.

LITERATURNAYA GAZETA has repeatedly written about the wastefulness of such an "economy" in engineering work. And here it was discovered that 20% of the wages under the prevailing circumstances are expended (I cite the branch journal STROITEL'STVO TRUBOPROVODOV) on "wages for intrashift work stoppages caused by shortcomings in engineering and technical preparations and material-technical support of production." Each fifth ruble spent in vain! That's what comes from saving on engineers... It was something to think about. The constructive thought of the experiment initiators saw a reserve in these losses.

As soon as the wages of the engineers were set in relation to the timeliness and feasibility of their solutions, immediately, after "wavering," the work stoppage curve dropped off. And the MTPLT, according to the comment of Yu. R. Anpilogov, "raced more rapidly along the pipeline route." That does not mean

that the expedition participants found themselves in easier circumstances. On the contrary, they had rougher going; it was necessary to accomplish three times as much concomitant work. Regardless of all this, the 13th MTPLT (172 workers, 34 engineers and supervisors), for example, despite the "superstitious connotations" of the number assigned the team, in seven months demonstrated an "out-and-out" racetrack speed in laying the gas pipeline -- 100 meters per hour.

A decisive role was played by the wage structure, in which there has been a significant increase in the percentage of the variable fraction. It is dependent only on the diligence of the worker.

Miserliness pays off in two ways! This is simple wisdom; if it is assimilated or adhered to it destroys the usual stereotypes of a "cautious economy." It is found that generosity in the granting of bonuses can lead to real thrift.

It has become good to pay for workers doing more than one trade and the number of workers is reduced by 56.8%. Some of the saved wages, in accordance with the Shchekinskiy method, have been diverted to the reserve for the granting of bonuses. Additional pay has been granted for reducing the loss of material, fuel and energy, for increasing the times between repairs for equipment, for increasing the quality of work...

The most weighty increment to wages here is from the gain in time. Work is done 1 1/2-2 times more rapidly, excellently, work fully worthy for the granting of bonuses intended for the entire planning period. According to this idea, if they could finish a year's work in three days, in accordance with the rules of the experiment they would immediately receive the entire annual (!) bonus. Of course, they cannot do it in three days. But a speed-up by two or more times becomes evident.

But is generosity not a bad thing? asks another reader. The fear in itself is ruinous for the economy. As is well known, the bonus is paid only after the work is entirely finished, the product is used by the consumer, the structure has been put into operation, the technical innovation has been put into mass production, etc. Reduction in the time of production, construction and introduction is the most advantageous basis for the awarding of bonuses!

It is true that everything goes awry if these sums are divided evenly. Each month the payroll must show "who is who." The principles embodied in the experiment created the necessary prerequisites enabling workers and engineering and technical personnel to earn (we emphasize earn, and not simply receive) from 1 1/2 to 5 or more base pays or wage scales. But he who does his work in a haphazard way, as they say, is stuck with the rock-bottom pay or wage.

The "burst of collective spirit," about which Tvardovskiy spoke, is conspicuous in their work. In the computations use was made only of the real value of the personal contribution to the common success. And it turned out that the greatest of the paid-out sums did not exceed 750 rubles per month and the minimum did not drop below 1 1/2 times the scale.

And nevertheless the first stage in the experiment was not without its stresses and strains. From time immemorial the welders in the field have been the privileged people. Usually no one could compete with them in wages. And suddenly the overall indices in the payrolls from month to month began to even out. At first this caused perplexity among some of the welders. However, the reliability and the clarity of the system for evaluating work performance used here (in combination with consistency with other democratic principles in the life of the MTPLT) were capable of withstanding conflicts.

The engineers came out all right, and among the workers no more than 5% were dissatisfied with their wages. In general, the "attitude toward the new system for the organization and payment for work, the prospects for its improvement and extension are positive," state the sociologists, who questioned each fourth participant in the experiment.

It is interesting that the sociologists discovered some number of "individuals who could not overcome their distrust of the new system." They could not overcome their distrust, but they somehow performed well. How could this be? In all probability, the new, uncustomary atmosphere of a primary production group exerted its influence. It pleased people that now the group became a fully authoritative entity in its sector and definite demands could be made on higher echelons: according to the contract the headquarters of the trust was obliged to support the MTPLT on the work front with all the materials and technical facilities necessary for construction. And this already changes the work morale of people. It gives rise to a diligence which under ordinary conditions is often crushed between the hammer of "give!" from the higher echelons and an empty anvil.

Think: the construction brigade, and the MTPLT, I repeat, in essence, is a large multidiscipline construction brigade, can now receive material compensation for all possible blunders and omissions of higher and outside organizations! Earlier there could be no thought of this. An attempt was made at affording MTPLT the possibility of exerting an influence on all echelons of their production rear. Strictly speaking, it is possible to work only on such a basis.

We have spoken about the first stage of the experiment in the Ministry of Construction of Petroleum and Gas Industry Enterprises. In the future ten times as many teams of pipeline workers will participate in the experiment.

Are the initiators themselves confident that what they have begun has a future? To be more precise, how sure are they that the framework of the experiment can be expanded tenfold?

B. Ye. Shcherbin: "Experience has shown the advantages of the multidiscipline technological line teams. Now this has become the norm for us. By the application of such organizational principles we will solve the problem before us. There can be no retreat. If we want to do something new and unusual it is necessary to be able to burn our bridges behind us in some organizational matters."

Again and again you become convinced: there is no paradox in that generous pay is capable of lowering the cost of work production. Provided, to be sure, that this generosity increases work productivity even more rapidly.

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PIPELINE CONSTRUCTION

PENZA PLANT INCREASES OUTPUT OF BALL VALVES

Moscow IZVESTIYA in Russian 11 Jul 83 p 1

[Article by I. Kalashnikov, Penza]

[Text] The "Penztyazhpromarmatura imeni 60-letiya SSSR" production association has tripled the production of large ball valves for the Urengoy-Pomary-Uzhgorod gas pipeline and other gas arteries in the country.

Penza workers have been able to organize the production of new items in already existing production areas, thereby economizing several million rubles. Reserves of machine tools have also been found. The first ball valves delivered to the pipeline sectors have received a high evaluation from operational workers. These complex items are characterized by a high operating reliability and are well supplied with automatic devices. The portfolio of orders for these items has begin to grow rapidly.

Machine builders have assumed the obligation to fill the quarterly orders of builders of the Urengoy-Pomary-Uzhgorod gas pipeline a month ahead of time. This resolution was backed up by precise engineering computations, thorough technical preparation and shock work.

The chief engineer, P. Petrov, stated: "The sharply inscreasing scales of production required the organization of production line techniques. The production line for housing parts has already been put into operation. It is giving a high rhythm of work to the other production links. Almost simultaneously a specialized welding section began to operate."

The production lines are supplied with excellent equipment and machine tools with programmed control. And in those cases when certain equipment is not available bold innovation will solve the problem.

The work of personnel is also efficiently organized. The progressive brigades headed by V. Churkin, N. Kurnosov and A. Alekseyev are responsible for the integrated fabrication of parts and components. Interchangeability of responsibilities and tutorship are well developed in these teams. They are working shoulder-to-shoulder.

The totality of all the mentioned conditions is yielding success. Whereas only recently an average of 15-17 ball valves were produced monthly, now it is 50!

Since the beginning of the year hundreds of items, including large valves for the builders of the Urengoy-Pomary-Uzhgorod gas pipeline, have been fabricated and shipped to gas pipeline workers.

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PIPELINE CONSTRUCTION

WANT ADS CALL FOR FOREMEN, PIPELAYERS, METALWORKERS FOR JOBS IN TYUMEN OBLAST

Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 83 p 23

[Unsigned item, "Invitation to Work"]

[Text]

In Tyumen Oblast:

Specialized Administration No 45 of the "Yugansktruboprovodstroy" Trust

Needed for permanent work on the construction of main-line pipelines:

Brigadier of metal workers and pipeline layers with work experience on the construction of main-line pipelines, machinists for valves and pipeline-laying equipment (Soviet-produced and foreign "KOMATsU" equipment), electric welders-ceiling workers (with work certificates), classes 5-6, semiautomatic electric welders, machinists and operators of AKDS-70 oxygen apparatus.

Workers are ensured living quarters in barracks in settlements along pipeline routes. Unmarried persons (without families) are invited.

Piecework wages, regional factor 1.7, northern increment 10% annually, but not more than 50%.

Address: Tyumenskaya Oblast, Nefteyugansk.

The "Severoenergoremont" Specialized Production Enterprise requires:

Metal workers: boiler makers, turbine and diesel specialists, electric metal workers, certified electric welders.

The nature of the work involves travel. Assignments with a duration up to 3 months in the Yakutia, Kolyma, Chukotka and Kamchatka regions.

All those arriving on the job will enjoy the privileges of the Far North: ensured living quarters regardless of departmental affiliation, with signing of a work contract for three years payment will be made for passage, transport of baggage, raises of two base pays or wage scales, free passage once in three years to a vacation location and back, time off from 30 to 42 workdays annually. Percentage increments calculated as follows: 10% of the base pay

or wage scale after six months of work (up to 60%) and two increments each year of work (a total of 80%), regional factor 70% regardless of the point of assignment (for work in Chukotka -- 100%). Payment for work on a time-bonus basis, using a piecework schedule. Bonus up to 50% monthly.

Living quarters in barracks. The matter of assignment of quarters is resolved in accordance with waiting list.

Address: 68500, Magadan, Ulitsa Pushkina, 11a, Personnel Section, telephone 2-99-94.

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PIPELINE CONSTRUCTION

BRIEFS

URENGOY--UZHGOROD PIPELINE--Hardly more than a year ago the specialists of the second work squad of the Transcaucasian Pipeline Construction Administration arrived at the Transcarpathian section. Here in the mountains the struggle was waged for every meter in the true sense of the word. In certain sections the slopes were on almost a 40° grade. At times only a helicopter could bring the construction workers to the job. They gained time that way. In the foothills of one of the mountains we encountered the excavator operator Suren Grigoryan: "There is no equipment that can help you out here, everything depends on people...." Yet another summit had to be taken on the steep slope of the Carpathian pass. It was even frightening to look on and see at what angle Suren was working, how boldly and skillfully he performed the complicated operations. He received reliable help from his rigger Vasiliy Shcherbinin. Each of the 70 km of the trunk pipeline laid in the Carpathians required extraordinary skill and courage on the part of the builders. The line portion of the gas pipeline in the Transcarpathian section became a true construction site of friendship. At the beginning of the year specialists arrived from the Polish People's Republic. Representatives of "Energopolya" laid the last 38 km of the westernmost section of the transcontinental gas pipeline on the territory of our country in a very short period of time. The last kilometers proved to be not only the most gratifying, but also the most difficult. The reason was that the mountains had been replaced by bogs. The world's largest gas pipeline has come to the border. But the friendship of the people who built it knows no borders. New jobs which will make that friendship still stronger await them in the future. [By I. Chopovdya] [Text] [Moscow KOMSOMOL'SKAYA PRAVDA in Russian 26 Aug 83 p 1] 7045

PIPELINES NEAR ORENBURG--The routes of several large gas pipelines cross the territory of Orenburg Oblast. Dozens of small branches have been laid from them to nearby cities and worker settlements. The gas pipelines have also run to villages. As a consequence the cheap natural fuel is being used by 15 cities and settlements, many rayon centers and large kolkhozes and sovkhozes. In a session of the Ispolkom of the Orenburg Oblast Soviet of People's Deputies measures for further expansion of gas service to rural areas were taken up and approved. It was decided that branches would be laid to Adamovka, Dombarovka, the largest centers for development of virgin land, to the rayon villages of Sharlyk, Aleksandrovka, Ilek and other rural points. [By P. Stepanenkov] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 30 Aug 83 p 1] 7045

PIPELINE NEAR LIPETSK--Having completed ahead of schedule work on the Lipetsk section of the Urengoy--Uzhgorod pipeline, the collective of the Trust "Shchegingazstroy" has undertaken to lay pipe on the line Novki--Ryazan--Tula--Orel which is 160 km long. The builders have included in their increased socialist obligations ahead-of-schedule delivery of the section for operation--before the 66th Anniversary of the Great October Revolution. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Sep 83 p 1] 7045

URENGOY GAS REACHES TAMBOV--Today the state commission signed the official document accepting the Tambov section of the Urengoy--Pomary--Uzhgorod gas pipeline for operation. Work in this section, which is 137 km long, was performed ahead of schedule and with high quality. The relief of the locality in the northern part of Tambov Oblast which the route passed through is not considered especially complicated, but it did not give itself up easily to the builders. The pipeline construction workers had to cross rivers, floodlands, and ravines, to lay pipe under railroads and highways with heavy traffic. The builders of the gas artery were helped greatly by the single contract covering the mixed technological work flow. It was thanks to that organization that high productivity in pipe laying was achieved here--1 km of finished gas pipeline per day. Today the best construction workers in the section have met in a rally held in Morshanskiy Rayon. Those who spoke noticed that they had kept their workers' word--the assignment was completed ahead of schedule. Urengoy gas will serve the world/peace (mir). The construction workers in the field gave assurances that they would apply all their knowledge, strength and experience to successfully perform the assignments on construction of other fuel arteries in the 5-year period as well. [Text] [Kiev PRAVDA UKRAINY in Russian 14 Aug 83 p 2] 7045

GAS PIPELINE IN TASSR--The collective of the Trust "Tatnefteprovodstroy" has won a labor victory. In the section of the gas pipeline from Urengoy to the center crossing the territory of TaSSR they have welded the 75th km of the route into the line. The most complicated section of the trunk pipeline has been covered half a year ahead of schedule. The pipeline construction workers in TaSSR built the central part of the trunk line from Vyatka to the Volga. There are still 15 tributaries of the Volga and Kama to cross, and a large number of railroads and highways. The construction workers will be moving in two technological work flows. The competition is headed by the collective of I. Shaykhutdinov, Hero of Socialist Labor, the initiator of introduction of the progressive method in the organization of work in this sector--the mixed technological work flow. "We used the experience gained in building the previous pipeline, and together we choose a new tactic," said Il'sur Garafiyevich. "The sections most problematical in the relief and those furthest from the basis had to be done first, before the freezes and snowstorms. The pipeline construction workers kept their word: they crossed the flooded bottoms of the rivers in dry weather, at an all-out pace. The collective of the Trust "Tatnefteprovodstroy" intends to complete all the line work on the 217-km section ahead of schedule. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Sep 83 p 1] 7045

GAS CONDENSATE PROCESSING PLANT--The riches of Urengoy make it possible to make combined use of a plant for processing gas condensate. Its construction

has begun near Surgut. So far such enterprises have not been built in West Siberia. But long ago a pilot unit was in operation at Urengoy, yielding gasoline and diesel fuel from condensate. The capacity of the plant being built is tenfold greater. At the same time construction of a main pipeline has been organized to carry the raw material from under the earth at Urengoy to the plant. About 100 km of the route have already been laid. A high-voltage electric power transmission line is being erected. The decision has been made to put the first phase of the plant into operation next year. [Text] [Moscow PRAVDA in Russian 30 Jun 83 p 2] 7045

PIPELINE INSULATION--The Rostov plant "Sovelit" has manufactured the first lot of a thermal insulation which differs fundamentally from previous types. "To be sure, many people have had occasion to see how they wrap municipal heating lines," we were told by I. Miroshnichenko, the plant's director. "In order not to lose heat en route, the pipe is carefully wrapped with wool, and foil is wrapped over that. This is awkward. The new material is a strip of plastic to which the wool insulation is immediately bonded." [By V. Ogurtsov] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 18 Oct 83 p 1] 7045

SEVERNYY BALKUM--NAIP GAS PIPELINE--The large gas pipeline covering the 65 km from Severnyy Balkum to Naip is ready for operation. Fuel from the new gas condensate deposit will flow through the large-diameter steel pipe to the main installations at Naip, and from there to the center of the country after treatment. The field with a capacity of 3 billion cubic meters of gas per year is a project near completion. The collective of the Trust "Naipgaz-stroy" and subcontracting organizations are conducting operations on a broad scale. An automated unit for prior preparation of the gas is now being installed, the republic's first sulfur-cleaning complex is being built, and utility and energy lines are being laid. Large blocks, elements and fabrications are being used extensively in the development. [By B. Dzhumayev] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 7 Jun 83 p 2] 7045

KIROVSKIY RAYON GAS PIPELINE--A steel pipeline for natural gas has appeared on the map of new-built structures in the Kirovskiy Rayon of the oblast. The construction workers of the mobile mechanized column from the "Lengazspetsstroy" trust yesterday completed welding of a 30-km segment of the steel artery from the Gryazovets-Leningrad gas pipeline into the main line. With the entry of this important segment of the oblast gas network into operation natural gas will be delivered to Otradnoye, Kirovsk and Mgu. Among the leaders of the socialist competition along the route running through complexly dissected swampy terrain is the insulation column headed by brigade leader M. Trofimov. Outpacing the work production schedule, the small group, in which each member has several trades, insulated and laid in trenches an 11-km segment of the line. At the same time construction began on gas distribution stations from which the blue fuel will be distributed to consumers. [By O. Kryuchkov] [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 8 Jul 83 p 2] 5303

KIRGHIZ PIPELINE DELIVERS PETROLEUM--The other day the brigade of Anatoliy Pisarev from the construction-assembly administration of the "Kirgizneft'" association reported on their great success. With a "good" evaluation this group put the Niyazbek-Kanibadam petroleum pipeline into operation. It was laid through complex mountainous terrain of Lyaylyakskiy Rayon. [By P. Khramov] [Text] [Frunze SOVETSKAYA KIRGIZIYA in Russian 4 Sep 83 p 1] 5303

FUEL PIPELINES OPERATIVE--A sector of the Nikol'skoye-Voronezh pipeline with a length of 202 kilometers has been put into operation ahead of time. It is intended for the delivery of gasoline and diesel fuel from the Kuybyshev and Ufa petroleum refineries. In addition, the Alan gas deposit in the Karshinskaya steppe in Uzbekistan has begun industrial operation. The gas is fed to the Mubarek gas refinery. [Excerpts] Moscow EKONOMICHESKAYA GAZETA in Russian No 18, Apr 83 p 2] 5303

UKRAINIAN PIPELINE SECTOR ADVANCES--The builders of the Ukrainian segment of the Urengoy-Pomary-Uzhgorod gas pipeline are approaching their goal. The thousandth kilometer of the steel strand has been laid in the territory of the republic. At the same time hydraulic tests are being made in the laid segments of the gas pipeline. A considerable part of the line is ready to receive Siberian gas. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 15 Jun 83 p 2] 5303

PIPELINE SEGMENT MEETS TEST--Cheboksary. Work on a 127-km sector of the Urengoy-Pomary-Uzhgorod gas pipeline in the Chuvash Autonomous Republic is in the concluding stage. Hydraulic tests are in progress here. Having its beginning at the Volga, the 57-km segment of the pipeline has already withstood reliability tests. [Text] Moscow SEL'SKAYA ZHIZN' in Russian 5 Jun 83 p 1] 5303

TURKMEN-UZBEK GAS LINKUP--The welding of pipes into long links has begun in the Saman-Tepinskoye gas deposit. These are intended for the pipeline which from here will deliver fuel to the gas refinery in the Uzbek city Mubarek. The gas in this deposit contains a considerable quantity of hydrogen sulfides. Each thousand cubic meters of local fuel with purification can yield about 35 kilograms of pure sulfur -- a valuable raw material, in short supply, for the chemical industry. In connection with the rapid growth of production of mineral fertilizers the demand for this product is increasing. That is why it was decided to produce sulfur from local gas. With the delivery of three billion cubic meters of Saman-Tepe gas each year it will be possible to obtain up to 100,000 tons of raw material for the production of mineral fertilizers, sulfuric and battery acid, as well as other products. The cost of one ton of sulfur extracted from natural gas will be three times less than with its production from ore in mine pits or underground extraction with its melting-out by hot water. Turkmen gas is being sent to Uzbekistan for processing beginning next year. This will be in fulfillment of an important resolution of the 26th CPSU Congress on increasing the output of valuable products from natural gas. [Turkmeninform] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 9 Sep 83 p 2] 5303

GAS PIPELINE SEGMENT COMPLETED--Ashkhabad. Yesterday natural gas was fed to Kunya-Urgenich -- the northernmost rayon center in Turkmenistan. Here work has been completed on construction of a 22-km gas pipeline through which gas will be fed from the Central Asia-Center main line. The large-scale gasification of residences and industrial enterprises has begun. [Text] Moscow GUDOK in Russian 9 Sep 83 p 1] 5303

CZECH TURBINES IN USE--More than 120 gas turbines produced in Czechoslovakia are operating at compressor stations on main gas pipelines in the USSR. Their designing and manufacture is the result of close cooperation between Soviet and Czechoslovakian scientists and designers. Specialists labored with particular good results on creation of the GT-750-6 turbine, whose improvement is continuing. Machine builders have mounted on it a vertical combustion chamber developed by the Neva plant in Leningrad. This will save 2.5 tons of alloyed steel per item. A system for automatic control of the turbine, the "Turbostat 6-B," has been jointly developed. With respect to quality it surpasses similar instruments produced by western firms. More than 70 "Turbostat 6-B" systems have already been sent to the Soviet Union. [Text] [Moscow VODNYY TRANSPORT in Russian 4 Oct 83 p 1] 5303

AUTOMATED GAS COOLING STATION--The first Soviet-produced automated station for the cooling of gas in the main gas pipelines, constructed under permafrost conditions, has been developed at the Kiev Automation Institute. The fact is that the warm gas transported through pipes heats the soil, which in summer has a temperature of 0 - -2°, as a result of which swamps develop over extensive territories. But this is not all. The warm gas disrupts the rigidity of the bracings, and from time to time pipes sag down and then heave up. The problem of reducing damage and the negative influence on the environment in regions of the laying of the gas pipeline has been solved by a group of scientists at the Automation Institute. During the current year the first experimental station will be installed in the neighborhood of Urengoy. [By Zh. Tkachenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Nov 83 p 2] 5303

URENGOY-CENTER PIPELINE PROGRESS--The first 50 kilometers of large-diameter pipes have been welded into a "strand" in the Tyumen' sector of the Urengoy-Tsentr-1 gas pipeline. It runs in the same corridor as the export line to Uzhgorod and will become the 11th gas artery originating from the deposits of the Tyumen' North. Prior to the end of this year the pipeline layers will have laid about 500 kilometers of steel channel here. The tone of the competition on the new route was set by the brigade of welders headed by V. Mozharov from the Priob'truboprovodstroy trust, successfully using "summer" construction techniques. [By Zh. Andreyev] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 14 Sep 83 p 3] 5303

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REPORT ON CHAYKOVSKAYA GAS COMPRESSOR STATION

Moscow IZVESTIYA in Russian 26 Oct 83 p 1

[Article by M. Bulanzhe, correspondent, Minmontazhspetsstroy SSSR press center, Perm Oblast': "Port For a River of Gas"]

> [Text] Another compressor station, the Chaykovskaya, is being readied for opening on the Urengoy-Pomary-Uzhgorod arterial gas pipeline. Hydraulic pressure testing of the service lines is currently being completed.

Nail' Gil'manov finished the last weld seam and regarded his work with satisfaction. Everything was now ready for testing. Section foreman V. Gladkov gave the order: "Prepare to pump the water!"

The powerful pumps droned, and water rushed noisily into the pipeline, where the pressure was to reach 100 atmospheres. The welded joints must meet very rigorous quality standards. For this reason all joints are checked twice, once by the water pressure test and once by x-ray inspection.

The pressure gage point crept slowly toward zero. A person naturally likes to be present when his work is being rated, but the results of the tests will be known only in a few hours. And there was no time to wait around. Gil'manov's work crew immediately moved on to the next station.

Deadlines and quality: these factors are paramount in determining the pace of construction. Strict accounting is kept of the time. Excitement reigns at the construction site, but records are not an end in themselves for assembly workers. The most efficient technology has been worked out for equipping large gas compressor stations and skills have been honed. The start-up schedule has been followed without fail. The general contractors of the Votkinskgessstroy administration have created a good initial construction project, and it is the duty of the subcontractors to continue the "workers' relay race."

The work crew headed by S. Nikolayev is completing the fitting of equipment on the site of the gas cleaning and dust trap unit. Near at hand the welders have a transportable ballast resistor which they themselves have produced. It is a very convenient device, since it relieves the welder of the need to constantly run to the power supply unit to adjust the current strength.

The administration collective knows the value of time and how to manage it. The contract brigade system, which has been given the broadest possible application on this project, has become a significant work incentive. More than 90 percent of the equipment has been installed under the contract system.

Installation of the compressor plant equipment, the mighty heart of the gas pumping station, has been completed 2 months ahead of schedule. The huge volume of work was done by specialists of Soyuzprombummontazh Trust, First Leningrad Installation Administration.

"Of course they're tired of waiting for us at home," says work crew foreman Yu. Semyonov. "So we are trying to speed up our reunion with our families. We have pledged to deliver the facility by 7 November rather than at the end of December as scheduled. We are firmly resolved to celebrate the holidays on the Neva."

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COMPRESSOR STATIONS

NEW REMOTE-CONTROLLED COMPRESSOR MODELS

Yerevan KOMMUNIST in Russian 20 Nov 83 p 2

[Article by A. Sarukhanyan, freelance KOMMUNIST reporter, "Advanced Developments in Production: Compressors of a New Type"]

[Text] The Armkhimmash Association was established 10 years ago on the basis of compressor, pump, and fitting plants. One of its fundamental specialized activities is production of atmospheric air compressors, which are very widely used in various sectors of the national economy.

The Association currently manufactures 15 variously modified special and general purpose compressors as well as mobile compressor stations.

In the Eleventh Five-Year Plan the Association's designers are carrying out an important task, that of developing and starting up production of radically new compressor models.

"We have already accomplished quite a bit of work in this direction," says the chief designer of Armkhimmash, Marlen Avanesyan. "We have started production of new compressors which will soon entirely replace certain obsolete models. These new models have already been placed in the highest quality class and are easy-to-use high-performance compressors. The automatic control console allows one operator fully to monitor the entire operation of a unit. This model has another advantage over its predecessors: it weighs 300 kilograms less."

The performance of the ninth version of this model is even higher. The designers of the Association are currently at work on this version.

The Association's designers very recently completed work on design and production of prototypes of another two compressor models. They have undergone pilot plant testing and have been submitted to an interdepartmental commission for approval.

These accomplishments are the product of efforts by the entire staff of the Association, and above all of design office heads Svetlana Mosesova and Grachik Babasyan, engineers Eduard Khosrovyan and Volodya Avakyan, mechanic Mkrtych Mkrtchyan, lathe operator Lyudvig Boshyan, and others.

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CSO: 1822/94

FIGURES ON CEMA FUEL AND ENERGY PRODUCTION, USE CITED

Moscow ARGUMENTY I FAKTY in Russian No 43, 25 Oct 83 p 4

[Article by E. Sheynin, candidate of economic sciences: "How the Energy Problem Is Being Solved"]

[Text] In recent years the fuel and energy problem has grown more acute everywhere in the world. This is explained, in particular, by the fact that fuel resources are unevenly distributed and that the conditions for their recovery are becoming increasingly complicated.

At the same time the situation in the countries of the socialist community has nothing to do with the energy crisis in the capitalist economies. Moreover, the experience of the CEMA countries shows that the prerequisites needed to solve this problem successfully are precisely those available to the socialist community.

Through Joint Efforts.

The main tasks of energy policy have been defined in the five-year and annual national economic plans of the CEMA countries on the basis of party congress decisions. They include the following:

--a consistent change in the fuel and energy balances in favor of domestic energy resources;

--the development of nuclear power engineering;

--achieving a qualitatively new stage in the saving of energy and fuel.

Socialism is resolving these tasks primarily by way of mutual cooperation. Socialist integration in this sphere offers advantages that are inconceivable within the framework of capitalist integration with its egoistical interests and economic piracy.

The following facts indicate the scale of the CEMA countries' long-term goal-oriented program for cooperation in the field of energy, fuel and raw materials, approved at the 32d CEMA session in 1978. The program provides for the implementation of 87 measures and the conclusion of 51 agreements, including

agreements on the construction of projects, international specialization and cooperation in production, and scientific and technical cooperation.

A first step in the development of the energy system for the CEMA member countries was the construction and commissioning of the 838-kilometer 750-kilovolt power transmission line between Vinnitsa (USSR) and Albertirsa (Hungary).

The strategy of the long-term goal-oriented program for cooperation stems from the fact of the great self-sufficiency of the CEMA member countries in terms of energy resources.

The populations of the CEMA member countries make up only 10 percent of the world's total population, but the CEMA countries account for the following proportions (as a percentage of the world total):

--33 percent of industrial output;

--about one-third of energy production, that is, 2.5 billion tons of fuel in conventional units, including:

--21 percent of world generation of electric power;

--36.2 percent of world coal recovery;

--24.0 percent of world oil and gas condensate recovery;

--34 percent of world natural gas recovery.

In addition to the long-term goal-oriented program for cooperation there is also a scientific and technical prediction for solving the fuel and energy problems through the year 2000 and beyond.

The efforts of the CEMA countries in scientific work on questions of energetics are being focused on research on the problems of converting coal to liquid or gas fuel, increasing the throughput capacities of power transmission lines, extending the use of underground alternating-current lines and so forth.

All this indicates the flexibility of energy strategy in the countries of the socialist community.

Today the extensive scientific search, accurate economic calculations and agreed policy in the energy field are bringing forth their fine fruits.

At the same time, coordination of plans not only does not exclude the use of kinds of energy resources typical of a given country, as some economists in the West assert, but on the contrary, even makes provision for this. And the optimal "set" of these resources makes it possible, in particular, to save the kinds of fuel that are to some extent or other in short supply.

A Panorama of Experience.

* In Hungary's fuel and energy balance the proportion of oil was cut from 41 percent in 1978 to 35 percent in 1982. Thanks to further growth in the extraction and use of low-grade coals and the commissioning of the first unit of the Paks nuclear power station, the proportion of liquid fuel in total demand for energy resources has declined even more markedly.

* Since Vietnam possesses major water resources spread evenly across its territory, priority is being given to hydroelectric power in the construction of power stations in the country. One of the largest in the country will be the Hoa-binh hydroelectric project on the Black Da, being built with help from the Soviet Union.

* In the GDR, as a result of the more active use of its own resources in economic turnover, the proportion of lignite in the country's energy balance increased from 64 percent to 70 percent in 1982. [as published]

* In Poland, within the framework of the general course toward eliminating the disproportions and profound disruptions in the national economy, many of which arose as the result of the actions of counterrevolutionary forces in 1980-1981, special attention is being paid to the reestablishment and development of the fuel and energy sectors. Hard coal and lignite remain the basic accessible domestic energy raw materials and the most reliable.

* In Romania a more rational use of energy sources is being achieved by the construction of hydroelectric power stations, the more extensive use of solid fuels, accelerating the implementation of a program to construct the first nuclear power station, and increasing the proportion of new kinds of energy.

* Important tasks in the field of the rational use of energy resources in the Soviet Union were set by the 26th CPSU Congress. The structure of the energy balance in the USSR is being improved through the rapid development of nuclear power engineering and increasing the extraction of cheap coals from the Ekibastuz, Kansko-Achinsk and Kuznetsk basins. The use of hydropower sources is being extended: during the period 1981-1985 it is planned to commission hydroelectric power stations with capacities of 12,000 megavolts. During the same period generation of electricity at nuclear power stations will almost treble.

During the present five-year plan the proportion of the nuclear power stations in the generation of electric power will be 26 percent in Bulgaria, 12-14 percent in the GDR and about 20 percent in Czechoslovakia.

Similar measures to activate the use of the most rational energy resources are also being implemented in the other countries of the socialist community. The generation of electric power is characterized by the figures shown in Table 1 below.

A Course Toward Thrift.

Saving fuel and energy and reducing losses during recovery and processing have become an urgent national economic task. In a number of the CEMA countries

Table 1. Electric Power Generated in 1982.

	Bulgaria	Hungary	GDR	Cuba	Mongolia	Poland	Romania	USSR	Czechoslovakia
Billions kW-hr	40.5	24.5	103	11.0	1.5	118	68.9	1367	74.7
1982 as percentage of 1981	109	101	102	104	97	102	98.3	103	102

* * * * *

the expenditure of fuel and energy resources per unit of output produced still exceeds the same indicators in the industrially developed capitalist countries.

In the socialist countries, reducing the specific fuel and energy expenditures is taking place thanks largely to the rapid increases in the capacities of units in electric power engineering, introducing progressive, waste-free technologies with fewer numbers of operations, reducing energy intensiveness in production, and improving the sector structure of industrial production so as to limit, as far as possible, the development of energy-intensive sectors in some countries.

The following figures indicate the results achieved from implementation of steps to save fuel and energy in the socialist countries.

In Hungary energy demand in all sectors of the economy has declined while the volume of production has increased. In the GDR, compared with 1981, in 1982 the national income grew 3 percent and was accompanied by a 25-percent decline in demand for fuel oil, and 30-percent decline for gasoline, 13 percent for diesel fuel, 11 percent for coke, and 3 percent for lignite. In 1982 some 2.4 million tons of fuel in conventional units were saved in the Czechoslovak national economy. As a result of reducing fuel consumption in the USSR, during the period 1976-1980 fuel use was cut 4 percent and 14 million tons of fuel in conventional units were saved.

Thus, the steps taken by the countries of the socialist community to solve the complex fuel and energy problem are already today bringing a tangible economic effect.

We see that the combined strategy of the CEMA member countries in an economic sector as important as energetics takes into account the interests of each country. "Energy" integration based on mutual aid offers its participants advantages undreamed of under capitalism.

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CSO: 1822/98

GSSR OFFICIAL URGES IMPROVED POWER SYSTEM

Tbilisi ZARYA VOSTOKA in Russian 15 Sep 83 p 2

[Article by Vakhtang Gomelauri, member of the GSSR Academy of Sciences and chairman of the Scientific Council for Fuel and Energy Problems of the Presidium of the GSSR Academy of Sciences]

[Text] It was emphasized at the June (1983) Plenum of the CPSU Central Committee that carrying out the Energy Program, that exceedingly important document with long-range significance, "a kind of GOELRO [State Commission for Electrification of Russia] plan under present-day conditions," requires an immense effort. Take, for example, the Georgian electric power system. In the period of the autumn-winter peak power loads, which coincides with low water in the republic's rivers, the Georgian electric power system is experiencing a steadily growing shortage of electric power. Accordingly, even at the present time there is a regularly recurring need during a large part of the year to restrict and even to completely cut off certain consumers.

It is obvious that under these conditions work cannot be properly stimulated in the field of electrification of production processes, in the mechanization of manual labor, and so on. In Georgia, accordingly, the electric power per worker ratio is very low both in industry and agriculture. It is sufficient to say that per capita electric power consumption in our republic is barely half of the national average.

This abnormal situation which has come about in the field of electric power supply has resulted from the predominance in the Georgian power system of seasonal hydroplants, which cuts back sharply on the generation of electric power following passage of the flood, and by the altogether inadequate capacity of the so-called base-load electric power stations, which have the ability to generate electric power uniformly both around the clock and throughout the year. Comrade G. V. Kolbin, secretary of the Georgian CP Central Committee, pointed to the difficulties that have arisen in the power supply of the GSSR economy in an article published in the newspaper PRAVDA on 17 August of this year. He noted in the article that "three-fourths of the capacity of the republic's power system is made up of seasonal hydroplants, and the electric power received from neighboring power systems does not always make up all of the shortage."

An extremely important role is played by the fact that electric power consumption in the power system undergoes sizable changes in the course of the day. To be specific, the power loads rise sharply during the morning and evening hours. These loads are customarily referred to as peak and semipeak loads. Most acceptable for covering these additional loads which change in time and which constitute about 40 percent of total electric power consumption, are large hydroplants which have storage reservoirs of sufficient capacity to afford them the possibility of covering the peak and semipeak loads every day throughout the year. The one-of-a-kind InguriGES and other hydroplants built and planned on the principal watercourses of GSSR represent power stations of that type.

The problem of generating the base load of electric power in the technically advanced countries of the world, and in the European part of the USSR in particular, is now being solved by building nuclear power stations. This direction in the development of up-to-date electric power engineering has resulted from the growing shortage of heavy fuel oil. An important role is also being played by the fact that in the petroleum refining industry at the present time methods are rapidly being mastered for obtaining from petroleum the maximum amount of gasoline, diesel fuel and other valuable fractions necessary for the chemical industry at the price of a corresponding reduction in the share of residual fuel oil in the products of refining.

For most power engineers in our republic the need to turn to nuclear power as the only realistic way of generating electric power to cover the base load in the Georgian power system became obvious even in the period of construction of the first nuclear power stations both in the USSR and abroad. But in the period 1969-1970 due attention was unfortunately not paid to the relevant studies done in the republic in this area.

By 1975 the attitude toward development of nuclear power in GSSR changed radically, but the delay indicated above was a considerable hindrance to timely settlement of the question of construction of a nuclear power station in Georgia and as a matter of fact resulted in the lag we have observed in development of electric power in the republic.

The delay in settling this extremely important issue was favored to a considerable degree by an erroneous conception of the harmful effect of a nuclear power station on the environment. The utter groundlessness of this erroneous idea has now been vividly demonstrated by experience in operation of nuclear power stations and by intensive development of nuclear power both in the European part of the USSR as well as abroad.

Development of the electric power industry in the European part of our country--that most densely populated part of the Soviet Union--is based on construction of nuclear power stations. As we know, the Kurskaya, Novovoronezhskaya, Leningradskaya, Yuzhno-Ukrainskaya, Krymskaya, Armyanskaya and other nuclear power stations are already on line. An extensive new nuclear power plant construction program is now being carried out in the European part of the USSR.

Nuclear power is developing at a fast pace in the countries of western Europe. It is sufficient to say that the electric power generated at nuclear power stations now makes up 40 percent of all the electric power consumed in France, 15 percent of all the power consumed in England and West Germany, and 25 percent of all the power consumed in Belgium and Sweden. The aggregate capacity of nuclear power stations in operation and under construction in Switzerland is 6 million kw. The scale of construction of nuclear power plants is still broader in the United States and Japan. We should also note the development of nuclear power in Yugoslavia, India, Finland, Argentina, Cuba, Pakistan, Romania, South Korea, Brazil, Mexico, and so on.

In spite of GSSR's sizable lag in development of the electric power industry, the question of building a nuclear power station in the republic has not been resolved as yet. To a certain extent this is explained by the need to build nuclear power plants at the present time in a number of other regions of the European part of our country. In addition, construction of a nuclear power plant involves sizable capital investments and requires making one-of-a-kind equipment and apparatus.

It is obvious that until this power station is built, the shortage of electric power to cover the base load in GSSR will take on still more sizable dimensions, especially since generation of surplus base electric power is not anticipated in the foreseeable future in neighboring power systems.

In coming years, then, much attention must be paid in GSSR to all-out electric power conservation both in the economy and in the household. A sizable contribution to performance of measures aimed at accomplishment of this task must be made by the technical directors of industrial enterprises. The public must also show a high level of consciousness in the matter of electric power conservation in the household.

"The future of our fuel and power industry--this is above all use of the most up-to-date nuclear reactors, and in future--practical solution of the problem of controlled thermonuclear fusion," Yu. V. Andropov noted in his speech at the June Plenum of the CPSU Central Committee. Putting a nuclear power station on line and further construction of large hydroplants on our principal watercourses designed to cover variable power loads will ensure optimalization of the structure of the Georgian power system and will create the conditions necessary to uninterrupted power supply to consumers.

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CSO: 1822/79

OIL AND GAS SALES TO WESTERN EUROPE QUESTIONED

Moscow ARGUMENTY I FAKTY in Russian No 35, 30 Aug 83 p 8

> [Text] As we know, a portion of our fuel is leaving the Soviet Union to go abroad. Are we doing right to sell so much petroleum and gas to the capitalist countries? Aren't we losing more here than we are gaining?
>
> V. Zyuz', Donetsk; A. Malashenko, Tyumen; and others

The development and improvement of the fuel and power base of our country's economy has been a subject of constant attention of the CPSU Central Committee and USSR Government. In the period between 1975 and 1982 petroleum production (including gas condensate) has increased by 122 million tons: from 491 to 613 million tons; that of natural gas by 212 billion cubic meters: from 289 to 501 billion cubic meters; that of coal by 17 million tons: from 701 to 718 million tons. Electric power production has increased by 328 billion kwh over that period: from 1,038 to 1,366 billion kwh. With respect to total production of petroleum (including gas condensate) the USSR occupies first place in the world, and with respect to production of coal, natural gas and electric power--second place in the world.

The USSR Energy Program, which, as defined by Yu. V. Andropov, general secretary of the CPSU Central Committee and chairman of the Presidium of the USSR Supreme Soviet, is "an exceedingly important long-range document, a kind of GOELRO [State Commission for Electrification of Russia] plan under present-day conditions," calls for further development of the fuel and energy sectors of the economy on an up-to-date scientific-technical foundation.

The Soviet Union has a reliable supply of natural reserves of various energy resources, which makes it possible to settle the question of developing them in an interrelated way and with a view to the long term both to satisfy domestic needs and also for export. In the 11th Five-Year Plan a sizable increase in the production of fuel and power was envisaged, including bringing petroleum production (including gas condensate) up to 620-645 million tons by 1985, that of natural gas up to 600-640 billion cubic meters, that of coal up to 770-800 million tons, and that of electric power up to 1,550-1,600 billion kwh. Moreover, under the Energy Program particular attention is being paid to accelerated development of the huge reserves of natural gas in the north

of West Siberia, which makes it possible to satisfy domestic needs and expand gas exports on a long-range basis. At the same time use of petroleum and petroleum products as boiler and furnace fuel has been curtailed even though petroleum reserves in the north of West Siberia make it possible to augment its production all the way up to the end of this century. Nuclear power engineering is setting the pace in its development. The growth of production of electric power, which is planned in the amount of 255-305 billion kwh, is being achieved mainly from nuclear fuel, hydropower and the use of coal in the country's eastern regions. The task of building the foundations of a thermonuclear power industry is being realistically advanced.

This line in the development of fuel and power resources makes it possible to increase gas exports and also to set aside some of the petroleum produced for export. At the same time the Soviet Union is receiving certain quantities of gas and petroleum from certain countries in the framework of trade and economic cooperation with them.

On the whole the share of fuel and power allocated for export (solid fuel, natural gas, petroleum and petroleum products, and electric power) does not exceed 15 percent in the USSR fuel and energy balance. Moreover, most of the export deliveries are to the socialist countries which are CEMA member countries within the frameworks of socialist economic integration, which is taking place in the fuel and energy sectors on the basis of long-range target programs for cooperation among the fraternal countries.

Fuel exports to the capitalist countries promotes development of mutually advantageous trade with them and optimum use of the capabilities of foreign economic relations to increase the efficiency of the Soviet economy.

As we know, our country's economic development has become more complicated in recent years not only because of poor crop years in agriculture resulting from weather conditions, but also because the principal centers of the fuel and power sectors and other sectors of the extractive industry have moved to the east and north, and also because of the related need to transport immense quantities of fuel and energy to the European part of the country. These problems are being dealt with effectively. A mighty petroleum and gas complex, which in 1983 will furnish 60 percent of all the country's petroleum production (including gas condensate) and a large portion of gas production, has been built in the shortest time in the uninhabited north of West Siberia, in a period of time unprecedented in other countries, and it is continuing to develop at a fast pace. Construction of large-scale power stations is being organized to utilize the immense coal reserves in the Kansk-Achinsk and Ekibastuz coal basins; large new hydropower plants are being built on the rivers of Siberia and the Far East. In 1983 half of all the country's fuel will be produced in Siberia as a whole. The world's largest transport system has been built to supply fuel and energy resources to the European regions, including power transmission lines and pipelines. In the current 5-year period another five gas pipelines are being built to deliver gas to the European regions and another for delivery of gas for export.

This huge scale of construction requires immense capital investments not only for the actual construction of production facilities, but also to build from scratch the entire related infrastructure related to their construction and operation, including roads as well as housing, consumer service facilities and other construction to guarantee normal living and working conditions for people. This is being done mainly on the basis of domestic engineering and technology.

The export of a portion of the growing volume of fuel production makes it possible to obtain from abroad additional resources of equipment and machines both for the fuel and energy sectors as well as for other sectors of the economy. The use of imported equipment and materials, including, for example, large-diameter pipe for fuel and energy construction projects, eliminates the need to allocate large capital investments to expand their production and thereby divert funds from development of other sectors, guaranteeing in this way a saving on social labor, a gain in time, and also sector proportionality in economic development.

The fact that prices of petroleum and accordingly for natural gas and other energy resources have risen many times over on the world market during the seventies makes it possible to export them with high efficiency for the economy. The value of fuel exports from the USSR to the capitalist countries has increased from 0.7 billion rubles in foreign currencies in 1970 to 13 billion rubles in 1980 and more than 17 billion rubles in 1982. In just the last 3 years fuel exports to the capitalist countries have brought in more than 35 billion rubles of convertible currency, which has made it possible to pay for about 80 percent of all imports of goods from those countries, including equipment, machines and transportation equipment worth 14.8 billion rubles and large-diameter pipe worth 4.8 billion rubles. The imported machines and equipment include drilling and geological exploration equipment worth 730 million rubles, roadbuilding machines and equipment worth 1.1 billion rubles, etc. The benefit from obtaining energy resources in exchange for deliveries of equipment is also quite obvious to our trading partners in the capitalist countries. The conduct of this kind of mutually beneficial trade materially reinforces the Soviet Union's course of foreign policy aimed at strengthening peace and peaceful coexistence of states with differing social systems.

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CSO: 1822/79

MINSK HEATING SYSTEM RECONSTRUCTION

Moscow STROITEL'NAYA GAZETA in Russian 1 Jul 83 p 3

[Article by V. Grech, engineer: "Heat in Large Cities"]

[Text] The November (1982) and June (1983) Plenums of the CPSU Central Committee have outlined ways of further performance of the Energy Program, including the creation of economical new technology, wide application of no-waste and energy-saving technologies in industry and construction of improved TETs and ATETs.

Today the growth of heat loads and their concentration in the country's large cities and industrial centers have created conditions favorable to augmenting capacities and parameters of TETs. This has substantially improved the efficiency of combined production of heat and electric power.

Nor is it any accident, of course, that the work of building the heating system in Minsk was first to be named on the list of contestants for the prize of the USSR Council of Ministers in the field of project planning and construction.

It is not difficult to imagine the size of the area usually occupied by heat and power stations--they are large. And it is quite clear that it is not at all feasible to locate them within the city limits.

This is unsuitable for reasons that have to do with city development, but also the ecological equilibrium could be upset.

On the other hand, taking the TETs out of the city will confront designers and builders with difficult new problems. It is especially complicated to lay main transit heating lines with a diameter up to 1 meter and a length of about 30 km and to build area water-heating boilers which after the TETs is put into operation will go into the mode of operation to cover peak loads.

Creation of the Minsk heating system is a kind of turning point in development of heat engineering today. It is calculated to supply heat and electric power to housing developments that exist or are under construction with a population of more than 600,000, along with many public buildings and industrial enterprises.

The plan envisages the most progressive solutions: water-heating boilers have been placed outside the area of the TETs, and use of a higher temperature makes it possible to reduce the number of pumps in the network. This has brought about a sizable saving of metal, capital outlays and labor inputs, and it has also reduced the consumption of electric power to pump water in the network.

Thanks to introduction of the progressive features, the cost of building the TETs has been reduced by 8.66 million rubles.

Reliability is becoming especially important in a large-scale heating system. This has been taken into account here in Minsk: should there be an emergency shutdown of the pumps of the TETs and damage to the supply lines, provision has been made for every boiler plant to switch to independent operation. The experiment in operating the first phase of the Minsk heating system has proven in practice the reliability, high efficiency and economy of such systems.

The Minsk heating system is a new direction in development of heating systems, one which can also be utilized intact to build TETs using atomic raw materials.

Nuclear heat and power plants--extremely large sources of heat--cannot be located in the immediate vicinity of settlements. On the other hand construction of a boiler plant using organic fuel to cover peak loads is not possible on the grounds of the ATETs because of the high temperatures in the trunk heating supply lines.

That is why creation of large area boiler plants in the zones of heat consumption is an obligatory stage for the future ATETs.

These principles are being applied today in schemes for heat supply of such cities as Moscow, Leningrad, Odessa, Kuybyshev, Volgograd, Gorkiy, Penza and Voronezh.

The heating system in Minsk, designed by VNIPIEnergoprom [All-Union Scientific Research and Project Planning Institute of the Fuel and Power Industry] and built by the Trust Belenergostroy of the USSR Ministry of Power and Electrification, is a prototype of future heating systems using both organic and nuclear fuel.

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CSO: 1822/79

GENERAL

TYUMEN BOTTLENECK DESCRIBED AGAIN

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Oct 83 p 1

[Article by A. Savinykh, chief of the Trade Administration of the Tyumen Oblast Ispolkom: "Where To Store the Goods?"]

[Text] A railroad train arrived at the railroad station in the city of Surgut. One of its sections was consigned to the worker supply administration (URS) of the Trust "Surgutenergostroy." The URS does not have its own refrigerator, and its chief P. Nikoruk went begging to the petroleum people, tearfully imploring them to take at least 30 tons or so of cooking fat for storage. But the answer he heard was this: They would be glad to help, but they had nowhere to put their own property.

Following similar exchanges in the URS's of the builders and geologists, whose small-capacity refrigerators were also crammed full, Petr Mikhaylovich went to the gas people:

"Come to my aid, brothers! After all, the penalties are increasing not by the day, but by the hour!"

They did help him out. At a cost to themselves, of course. Under an absolutely strict condition: that in 2 days he find some other "housing." Their own goods stood in the entrance....

I am not laying it on thick. Development of the plant and equipment of local trade is lagging catastrophically behind the very rapid growth of this region of petroleum and gas production, whose population is growing by more than 100,000 every year. There has accordingly been a fivefold growth in commodity sales in the oblast, but the area of industrial wholesale depots and refrigerators has remained practically at the 1965 level for the past 18 years.

Back 10 years ago a decision was made to build a refrigerated facility in Surgut to take 10,000 tons of produce. The location was not chosen by accident. This large industrial center of petroleum production in the Ob Valley is located at the intersection of rail and water routes connecting Tyumen with other cities where petroleum and gas are being produced. This is where goods need to be stockpiled for the winter months, goods which thereafter, in the days of the navigation season which pass rapidly, are to be carried to

the out-of-the-way areas where the mineral exploration teams, construction workers and oil and gas workers are working today.

Why is it that even the first step has not been taken to build a facility of vital importance to the entire region even now in the second 5-year period?

At that time, 10 years ago, 9 million rubles were allocated to build the refrigerated facility in Surgut. But while the Institute "Giprokholod" has been doing a so-so job on the technical documentation for the project, the prices of building materials have increased in the country. The total cost of work on the future refrigerated storage facility has, of course, almost doubled. It is this objective reality that has become the stumbling block.

The Trade Administration of the Tyumen Oblast Ispolkom has repeatedly called upon RSFSR Mintorg [Ministry of Trade] to allocate investment ceilings for completion of the operations called for in the project. In answer to this we were promptly told: You will not get even a kopeck beyond what has been stated.

A paradoxical situation comes about: the money which the trade organizations have already paid the railroad in penalties would have been quite sufficient to build the refrigerated storage and a wholesale depot in Surgut, and an ice cream factory in Tyumen. But so far no mention of this has been made at all.

The development of the country's principal source of fuel is going forth at an unprecedented pace. Quite soon the petroleum workers in Tyumen will begin to furnish the country 1 million tons of petroleum per day. At the end of the 5-year period the gas workers will achieve a daily average output of 1 billion cubic meters of the "blue" fuel. The pathfinders of yet another immense gas project--the Yamburgskoye Deposit--are building housing in a city which does not yet have a name. And the main thing is that there is no road to it. Which makes Surgut more important as a place for stockpiling and supply of goods for the oblast's rayons which are difficult to get to.

So what is more profitable: to conduct fruitless talks about a few million rubles needed to build refrigerated storage facilities in Surgut, or to lose many millions of state funds because of the acute shortage of refrigerated capacity and wholesale depots in the Tyumen North? I assume that the key officials of our ministry will ultimately furnish a specific answer to a question which will not suffer delay.

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CSO: 1822/79

BRIEFS

ROTARY EXCAVATORS--In the Kansk-Achinsk coal basin, where beds are being strip-mined, two new super-capacity rotary excavators are being installed, each with an output of 5,250 cubic meters of coal per hour. These giants possess supreme technical characteristics: they weigh 800 tons less than machines in the same class, electric motors with a rating of 4,000 kw make it possible to break up the bed of coal even without prior drilling and blasting to break it up, and the reach of their booms is 65 meters. The excavators will move on "walking skis," and the length of each ski will be 40 meters. The Zhdanov excavators will deliver the coal to a one-of-a-kind conveyor capable of carrying 10,500 tons of the fuel per hour. This huge moving road, 14 km long, extends from the face where the excavators will be operating to the coal storage area for the large thermal electric power stations whose construction is scheduled for completion by the end of this decade. [By N. Lisovenko] [Text] [Moscow IZVESTIYA in Russian 14 Oct 83 p 1] 7045

PAPER GREENHOUSE HEATING DUCTS--Kiev scientists have proposed an innovation that will help to reduce the cost of growing produce in greenhouses using plastic film. Together with specialists of the Production Association "Tulabumprom" they have developed a technology for obtaining strong light heat ducts made of multiply glued paper and cardboard covered inside and out with waterproof polyethylene film. "About 1,500 hectares have been committed to the gardens under plastic in the Ukraine," said Yu. Sklyarenko, candidate of chemical sciences and supervisor of the development project. "But because of the lack of artificial heating, most of this area is used only in the early spring. To extend the season into the winter months requires an enormous amount of pipe made of special steels which will not corrode even at 100-percent humidity. But there is an acute need for such materials in many other sectors of the economy where it is simply impossible to replace them. The cardboard-paper ducts are equal to metal ducts in their performance characteristics. They are considerably lighter and cheaper, simpler to manufacture and are installed far more quickly. The warm air maintains constant temperature in them. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Sep 83 p 2] 7045

EXCAVATOR WINS GOLD MEDAL--An innovation of the Kostroma machinebuilders has been awarded the gold medal of the USSR Exhibition of Achievements of the National Economy. The EO-5115 excavator, manufactured at the plant "Rabochiy metallist," will bring a benefit of 3 million rubles to the economy. The

Kostroma excavators have given a good account of themselves in use by builders, but the new model's predecessors had one essential shortcoming: low speed and a consequent limitation on its independent movement. Design changes of the running gear allow the new excavator to move quickly over a considerable distance like a tractor. This is especially important in building gas and petroleum pipelines and main rail lines. By the end of the year 20 new machines are to be manufactured. [By I. Klimenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Sep 83 p 2] 7045

EMPTY METAL DRUMS UTILIZED--A use has been found for empty metal drums in the Production Administration "Mangyshlaknefteprom khim." Every year tens of thousands of drums arrive on the Mangyshlak Peninsula containing chemical reagents for intensification of petroleum recovery. It is disadvantageous to carry the empty containers back in freight trains. Thus over the years large "deposits" of the drums have built up. Efficiency experts of the administration have created machine tools equipped with pneumatic shears and pressure rollers. The use of these machines makes it possible to obtain from the drums about 50,000 square meters of sheet metal per year. [By G. Groyser and B. Vakulenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Sep 83 p 2] 7045

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